SCHOOL OF LAW
CASE WESTERN RESERVE UNIVERSITY

Case Western Reserve Law Review

Volume 45 | Issue 2

1995

Saving an Endangered Act: The Case for a Biodiversity Approach to ESA Conservation Efforts

James Drozdowski

SAVING AN ENDANGERED ACT: THE CASE FOR A BIODIVERSITY APPROACH TO ESA CONSERVATION EFFORTS

I. INTRODUCTION

Conservation is a state of harmony between men and land. Despite nearly a century of propaganda, conservation still proceeds at a snail's pace; progress still consists largely of letterhead pieties and convention oratory. On the back forty we still slip two steps backward for each forward stride.

ALDO LEOPOLD[1]

Conservation means different things to different people. To the average layperson, conservation may mean conserving only the most spectacular and awe-inspiring species of the world. To the biologist, life itself, in its infinite variety,[2] is awe-inspiring and worthy of conservation. We enter the twenty-first century in a state of crisis and uncertainty. The crisis concerns the unprecedented loss of biological diversity,[3] largely the result of human activities.[4] The

1. ALDO LEOPOLD, A SAND COUNTY ALMANAC 222 (1966).

2. Estimates of biological diversity range from 10 million to 100 million species. Paul R. Ehrlich & Edward O. Wilson, *Biodiversity Studies: Science and Policy*, 253 SCI. 758, 759 (1991). One researcher estimates that there may be 10 to 80 million species of tropical forest arthropods alone. Nigel E. Stork, *Insect Diversity: Facts, Fiction and Speculation*, 35 BIO. J. LINNEAN SOC. 321, 321 (1988). *See also* Edward O. Wilson, *Biodiversity, Prosperity and Value, in* ECOLOGY, ECONOMICS, ETHICS: THE BROKEN CIRCLE 3, 5 (F. Herbert Bormann & Stephen R. Kellert eds., 1991) (finding 42 species of ants on a single tree in Peru).

3. *See* Edward O. Wilson, *Threats to Biodiversity*, SCI. AMER., Sept. 1989, at 108 (estimating that biodiversity is being reduced to its lowest level since the end of the Mesozoic era 65 million years ago). *See also* Peter H. Raven, *The Politics of Preserving Biodiversity*, 40 BIOSCIENCE 769, 771 (1990) (estimating that up to 65,000 plant species, or one quarter of the world total, will become extinct in the next several decades).

4. One author lists the following factors as the main causes of human-induced extinc-

uncertainty is a result of the rapid loss of species before they can be cataloged, let alone studied in their roles in the web of life and for their potential benefits for humanity. We have only a rudimentary understanding of the vast diversity of the existing biota,[5] and we have even less of an understanding of what is being lost.[6]

The focus of this unprecedented loss of biodiversity is often on the tropical rainforests. Undoubtedly, the magnitude of loss in these areas is extraordinary.[7] However, many of the unique and diverse ecosystems of this nation are also currently under siege. From the Everglades of southern Florida[8] to the tundra of northern Alaska,[9] once-pristine ecosystems are increasingly pressured by human development and the quest for energy resources. Even the once-prevalent wetlands[10] and prairies[11] are in danger of disappearing alto-

---

tions: "(i) the loss of habitat; (ii) the fragmentation of habitat-producing deleterious area, edge, demographic, and genetic effects; (iii) overexploitation; (iv) the spread of exotic (introduced and alien) species and diseases; (v) air, soil, and water pollution; and (vi) climate change." Michael E. Soulé, *Conservation: Tactics for a Constant Crisis*, 253 SCI. 744, 745 (1991). *See also* Raven, *supra* note 3, at 769 (noting that human population growth is a major factor in the decline of many species); Geerat J. Vermeij, *The Biology of Human-Caused Extinction, in* THE PRESERVATION OF SPECIES: THE VALUE OF BIOLOGICAL DIVERSITY 28 (Bryan G. Norton ed., 1986) (discussing the biological causes and consequences of extinction).

5. Although the vast majority of recent discoveries of species have been invertebrates, large vertebrates are still being discovered today, thus highlighting our utter lack of knowledge of our world's biota. For example, 11 out of 80 known species of cetaceans were discovered in the 20th century, the latest in 1991. In addition, a new family of large sharks, Megachasmidae, was discovered in 1976. *See* Peter Raven and Edward O. Wilson, *A Fifty Year Plan for Biodiversity Surveys*, 258 SCI. 1099, 1099 (1992).

6. *See infra* notes 20-38 and accompanying text (describing the benefits humanity receives from biodiversity).

7. *See* Raven, *supra* note 3, at 771 (estimating that tropical rainforests are being eliminated at the rate of one square mile every 10 minutes).

8. *See generally* BRADLEY G. WALLER, EFFECTS OF LAND USE ON GROUND-WATER QUALITY IN THE EAST EVERGLADES, DADE COUNTY, FLORIDA (1983) (detailing the effects of development on water quality and the general health of the Everglades ecosystem). For a detailed discussion of current efforts to restore the water quality of the Everglades, see *infra* notes 172-74 and accompanying text.

9. *See* Douglas B. Lee, *Oil in the Wilderness: An Arctic Dilemma*, 174 NAT'L GEOGRAPHIC 858 (1988) (exploring the current debate between oil exploration and conservation interests within the Arctic National Wildlife Refuge).

10. *See generally* REZNEAT M. DARNELL, IMPACTS OF CONSTRUCTION ACTIVITIES IN WETLANDS OF THE UNITED STATES (1976) (describing the effects of construction and development on the proper functioning of wetland ecosystems).

11. *See* Gina Kolata, *Managing the Inland Sea*, 224 SCI. 703, 703 (1984) (noting that even Illinois, "the prairie state," has only several hundred acres of original prairie remaining). For a history of early use and exploitation of the Illinois prairie, see DOUGLAS R. MCMANIS, THE INITIAL EVALUATION AND UTILIZATION OF THE ILLINOIS PRAIRIES 1815-40 (1964).

gether.

How we define conservation will have an enormous bearing on how much of the world's dwindling biota will be passed onto our children. We have traditionally embraced the goal of protecting only the spectacular and the awe-inspiring. This goal is embodied in the Endangered Species Act of 1973[12] (ESA) which implements a species-by-species approach to protect our nation's biota. As this Note will discuss in further detail, ESA has succeeded in protecting very little of our native biota, and has concentrated its efforts on a minimal number of charismatic species.[13] Unfortunately, such an approach ignores the magnitude of the loss that is occurring.

This Note will argue that conservation should concentrate on ecosystems and biodiversity as a whole, and that the current piecemeal approach to conservation should be abandoned. The current version of ESA is not properly adapted to further the goal of preserving ecosystem diversity.[14] Indeed, its success in protecting genetic diversity, or individual species, is also questionable.[15] The time has come for ESA to be changed to protect biodiversity at the ecosystem level. In so doing, ESA can become a model for biodiversity protection for the rest of the world, including such critical goals as preserving tropical rainforests. Moreover, it can help stem the loss of biodiversity in this country.[16] If we continue with our present version of ESA, we will in fact be taking two steps backward for every forward stride.

Part II of this Note will briefly discuss the justifications for preserving species and biological diversity as a whole. Part III will explore ESA's record in the conservation of individual species, and will offer several reasons why ESA has failed its mandate. Part IV will argue that ESA cannot adequately protect biological diversity, assuming arguendo that biodiversity protection is actually a goal of ESA. Part V will explore the scientific, political, and economic

---

12. 16 U.S.C. §§ 1531-1544 (1988).

13. *See infra* notes 104-10 and accompanying text.

14. *See infra* notes 162-74 and accompanying text.

15. *See infra* notes 66-77 and accompanying text.

16. We often bemoan the destruction of tropical rainforests in Third World countries, yet our ancient forests of the Pacific Northwest are falling at three times the rate of Amazonian rainforests. *See generally* ELLIOT A. NORSE, ANCIENT FORESTS OF THE PACIFIC NORTHWEST (1990) (exploring the deteriorating ecology of, and possible forest conservation tactics to, the Pacific Northwest). *See also* J. Michael Scott et al., *Species Richness: A Geographic Approach to Protecting Future Biological Diversity*, 37 BIOSCIENCE 782, 782 (Dec. 1987) (over 500 species and subspecies of North American plants and animals have become extinct since 1620).

justifications for reauthorizing ESA with an ecosystem approach to conservation. Part VI concludes with a discussion of some of the factors that should be considered in implementing an ecosystem approach toward the preservation of biodiversity.

II. JUSTIFICATIONS FOR PRESERVING THE DIVERSITY OF LIFE

As a preliminary step toward implementation of a scheme to protect life on earth, it is essential to explore the various justifications for taking on such an onerous task. The public must be aware of the various benefits of biodiversity if it is to be expected to tolerate short-term economic hardship. In addition, it is necessary to draw properly the distinction between biodiversity and genetic diversity. Biodiversity has been defined as "[t]he ecosystems, species, and genes that together constitute the living world."[17] Genetic diversity can be viewed as a narrow subset of biodiversity, as it considers the genetic variations within a single population or species.[18] As biodiversity considers ecosystems as a whole, rather than the individual species approach of genetic diversity, its preservation can be justified on similar and additional grounds. The focus of this Note is on the goal of conservation of ecosystems as a whole. Accordingly, the following justifications concentrate specifically on that goal, although many of these justifications apply to the conservation of genetic diversity as well. These justifications have been extensively addressed in the existing literature, and will not be considered at length. They are compelling, however, and help to place the magnitude of the existing crisis in its proper perspective.

---

17. Ted Kerasote, *Biodiversity: More Than Just a Word*, 209 SPORTS AFIELD 14, 14 (1993) (quoting John C. Ryan, research associate at the Worldwatch Institute). Biodiversity considers ecosystems as a whole, which can be defined as "[Areas] whose boundaries reflect . . . population processes and patterns, providing sufficient area, diversity, and complexity for continued self-organization and self-maintenance in the absence of catastrophic external disturbances." D. Scott Slocombe, *Implementing Ecosystem-Based Management: Development of Theory, Practice and Research for Planning and Managing a Region*, 43 BIOSCIENCE 612, 613 (1993).

18. *See* Paul R. Ehrlich, *The Loss of Diversity: Causes and Consequences, in* BIODIVERSITY 21, 24-25 (E.O. Wilson ed., 1988) (noting the worldwide loss of genetic diversity and the consequent weakening of the gene pool).

A. *Utilitarian Arguments*[19]

1. Direct Benefits to Humanity

The seemingly endless pageant of life on earth has provided numerous benefits to humanity, many of which are just now being tapped.[20] Perhaps most obviously, biological diversity has provided humanity with a vast abundance of food sources. Moreover, biodiversity will generate discovery of new food sources as it helps to protect current sources. For example, biological diversity is a natural form of protection for food resources: monoculture crops are highly susceptible to the ravages of predation and disease.[21]

Biodiversity has also yielded some of the greatest medicinal discoveries of this century. Indeed, fully one-fourth of all pharmaceuticals in the United States are derived from natural sources.[22] Discoveries continue at a rapid pace, and many are of great significance to humanity. Consider, for example, the Pacific yew, a rather unremarkable tree found exclusively in the understory of the fast-dwindling ancient forests of the Pacific Northwest. Virtually unknown until recently, it has been highly touted for its potential in the fight against breast cancer.[23] In addition, the anti-cancer drug vinicristine, commonly used in the successful treatment

19. While some of these justifications may be obvious to most readers, consider the following statement recently made in a popular news magazine: "I would agree: the variety of nature is a good, a high aesthetic good. But it is no more than that." Charles Krauthammer, *Saving Nature, but Only for Man*, TIME, June 17, 1991, at 82.

20. *See* Wilson, *supra* note 3, at 116 (noting that the National Cancer Institute currently screens nearly 10,000 natural substances per year for anti-carcinogenic and anti-HIV qualities).

21. Indeed, the use of monoculture crops can lead to great human tragedy in the form of famine and desertification. The Irish potato famine and the current crisis in the African Sahal are two examples of the potentially tragic consequences of using monoculture farming techniques. *See* Harold J. Morowitz, *Balancing Species Preservation and Economic Considerations*, 253 SCI. 752, 753 (1991).

22. Thomas Eisner, *Prospecting for Nature's Chemical Riches*, ISSUES IN SCI. & TECH., Winter 1989-90, at 31, 32 (also listing some of the uses of these drugs, which range from treating leukemia to heart disorders).

23. In response to these findings, Congress has adopted preservation measures as part of the Pacific Yew Act. 16 U.S.C. §§ 4801-4807 (Supp. IV 1992). For a detailed perspective on the pharmaceutical industry's response to the potential beneficial properties of the Pacific Yew, see *The Pacific Yew Act of 1991: Joint Hearing Before the Subcomm. on Fisheries and Wildlife Conservation and the Environment and the Subcomm. on Forests, Family Farms, and Energy*, 102d Cong., 2d Sess. 110-18 (1992) (statement of Zola Horovitz, Ph.D., Vice President, Business Development and Planning, Bristol-Myers Squibb Company).

of Hodgkin's disease, was derived from the Madagascar periwinkle.[24] Another species, the sea squirt, is currently being studied for its production of didemnin B, a drug that may fight numerous cancers.[25] Indeed, in light of the extraordinary number of plants and animals that have not been cataloged, let alone investigated for medicinal qualities,[26] there could conceivably be a cure for cancer or AIDS waiting to be discovered in the rainforests of South America, or even here in the United States. As the rate of extinction continues to grow, it becomes increasingly likely that we will lose enormously beneficial species before they are even documented.[27]

2. Indirect Benefits Through the Regulation of the Environment

Biodiversity also serves humanity and the planet as a whole in ways that are not immediately obvious to the casual observer. Due to their somewhat inconspicuous nature, these benefits can easily be overlooked in the debate between short-term economic growth and the preservation of biological diversity. The two concepts may actually be complementary, rather than adversarial. The indirect benefits that cleanse and sustain the vast multitude of environments are a function of both ecosystem and genetic diversity. Vast forest ecosystems, such as the tropical rainforests, help maintain the quality of the atmosphere, ameliorate climate changes, and aid in the generation and maintenance of soils.[28] Similar benefits accrue in our own forests, grasslands, and wetlands.[29] Where these benefits

---

24. *See* Eisner, *supra* note 22, at 31-32.

25. *See* William Booth, *Combing the Earth for Cures to Cancer, AIDS*, 237 SCI. 969, 969 (1987).

26. Consider, for example, the Madagascar periwinkle, a member of the Catharanthus family. Although it has been clearly established that it produces a chemical that is a viable treatment for Hodgkin's disease, none of the other five known members of the Catharanthus family have been thoroughly investigated for similar medicinal qualities. Even more disturbing is the fact that one member of the family is currently faced with extinction due to habitat destruction. Wilson, *supra* note 2, at 8.

27. Thomas Eisner laments that the "[l]oss of a species means loss of chemicals that are potentially unique in nature, not likely to be invented independently in the laboratory, and possibly of great use - particularly in medicine." Eisner, *supra* note 22, at 31.

28. For an excellent discussion of these and other indirect benefits afforded by biological diversity, see PAUL EHLRICH & ANNE EHLRICH, EXTINCTION 91-120 (1981). *See also* Ehlrich & Wilson, *supra* note 2, at 760-61 (illustrating the various services provided by biological systems, such as pest control, soil maintenance, and climate control).

29. For a description of the environmental and societal benefits of the ancient forests of the Pacific Northwest, see Jerry F. Franklin, *Structural and Functional Diversity in*

can be translated into economic values, the true magnitude of the beneficial services provided becomes evident.[30]

Individual species can also provide beneficial services to the natural environment. This often occurs when one species is directly linked to the viability of other species within the ecosystem, such as in predator-prey relationships.[31] Although non-biological factors tend to predominate in ESA's mandate of species-by-species conservation,[32] such beneficial properties arguably support ESA's species-by-species approach to conservation.[33] This type of ecological service is one example of the manner in which the preservation of genetic diversity can benefit and preserve an ecosystem as a whole.[34]

Temperate Forests, in BIODIVERSITY 166, 167 (Edward O. Wilson ed., 1988). For a discussion on the ecological benefits of properly functioning wetlands, see U.S. CONGRESS, OFFICE OF TECHNOLOGY ASSESSMENT, 100TH CONG., TECHNOLOGIES TO MAINTAIN BIOLOGICAL DIVERSITY 5 (1987) [hereinafter OTA REPORT].

30. For instance, one United States Army Corps of Engineers study of the Charles River wetlands in Massachusetts estimates its value at $17 million a year in flood control alone. OTA REPORT, *supra* note 29, at 5. The disastrous flooding of the Mississippi River basin in 1993 can also be linked to an extensive loss of primary wetlands. *See* Mary Fran Meyers & Gilbert F. White, *The Challenge of the Mississippi Flood*, ENVT., Dec. 1993, at 6 (detailing the flood's numerous costs, as well as its link to wetlands destruction).

31. One author lists the virtues of the wolf within an ecosystem as follows:

> (1) sanitation (removal of diseased animals to prevent epidemics), (2) natural selection (culling of deformed or genetically inferior animals before reproduction), (3) stimulation of prey productivity (acceleration of reproductive rates among prey through higher twinning and fertility), and (4) population control (maintenance of prey populations at levels that can be supported by the habitat, protecting against overgrazing, erosion, and desertification).

David Todd, *Wolves - Predator Control and Endangered Species Protection: Thoughts On Politics and Law*, 33 S. TEX. L. REV. 459, 478 (1992) (footnotes omitted). The fragility of this relationship is evidenced by the effects that exotic predators, such as the zebra mussel, are having within the Great Lakes basin. *See generally* Marguerite Holloway, *Musseling In: Exotic Species Hitch Rides in Ships' Ballast Water*, SCI. AM., Oct. 1992, at 22 (arguing that the introduction of the zebra mussel may reduce biodiversity on a global scale); Michael L. Ludyansky et al., *Impact of the Zebra Mussel, A Bivalve Invader*, 43 BIOSCIENCE 533 (1993) (detailing the zebra mussel's spread into the Great Lakes and its effects on the natural food web of the region). It should be noted, however, that the zebra mussel does have some beneficial properties. *See generally* Tracey Cohen, *Pests with Redeeming Values*, TECH. REV., July 1992, at 15 (noting that while the mussels do clog water intake facilities and tend to dominate natural food chains, they also act as biofilters and can help remove contaminants from the water).

32. *See infra* notes 88-130 and accompanying text.

33. The Endangered Species Act of 1973 specifically mandates the protection of individual species, defined as including "any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife which interbreeds when mature." 16 U.S.C. § 1532(16) (1988).

34. For a discussion of the other ways in which a genetic diversity approach can aid

As was evident in the discussion of direct benefits to humanity, the indirect benefits of biodiversity that flow to humanity and to the environment in general are not well understood. What is evident is the fact that biodiversity and genetic diversity perform a number of irreplaceable services for the planet.[35] The magnitude of the benefits are just now being discovered and quantified. The potential consequences of a loss of even one of these services is unknown.[36] What does seem clear is that at some point of loss, environmental systems will no longer be able to function properly. Any abrupt change in the functioning of these systems could result in unprecedented damage to human economic systems.[37] Thus, preservation of this life support system is one of the most compelling justifications for preserving as much of the world's biota as possible.[38]

B. Ethical Arguments: The Intrinsic Value of Nature[39]

The final justification for the preservation of biological diversity is markedly different from the previous discussions: it considers the worth of nature in terms of the simple right of every creature to exist. Drawing attention away from human utilitarian benefits is a difficult task, given our traditional bias towards anthropocentric values.[40] Indeed, these values are highly influential in today's so-

---

in the preservation of ecosystems as a whole, see *infra* notes 178-81 and accompanying text.

35. These benefits include the stabilization of soil, purification of groundwater, and the recycling of atmospheric gases. *See* Charles Chambers, *AIBS Submits Amicus Brief on Endangered Species Act*, 42 BIOSCIENCE 62, 62 (1992) (detailing amicus brief by the American Institute of Biological Sciences on behalf of biodiversity preservation).

36. Consider the ancient forests of the Pacific Northwest. Some ecologists contend that these forests act as a hedge against the accumulation of carbon dioxide in the atmosphere, and may slow the process of global warming. William Booth, *New Thinking on Old Growth*, 244 SCI. 141, 141 (1989).

37. Consider the worldwide damage that occurred at the hands of El Ñino, an extreme and unusual rising of water temperatures that occurs periodically in the equatorial zones of the Pacific Ocean. This seemingly innocuous event caused massive flooding in the United States and South America and widespread drought in India, Australia and Africa. Estimates of total worldwide damages exceed eight billion dollars. *See* Thomas Y. Canby, *El Ñino's Ill Wind*, 165 NAT'L GEOGRAPHIC 144, 154-55 (1984).

38. *See* Ehlrich & Wilson, *supra* note 2, at 760-61 (stressing the need to preserve biodiversity as a whole, since we do not know which species occupy key roles in ecosystems, the extinction of any of them might irreparably damage the web of life).

39. For an excellent background discussion on the ethical underpinnings and the intrinsic value of species and ecosystems as a whole, see Holmes Rolston III, *Environmental Ethics: Values in and Duties to The Natural World, in* ECOLOGY, ECONOMICS, ETHICS, *supra* note 2, at 73.

40. One author argues that our Judeo-Christian traditions result in a sort of "human

ciety,[41] and are reflected in the manner in which we allocate public and private charitable funds.[42] In addition, they have affected the implementation of endangered species preservation under ESA.[43]

The collective values of a society can have far-reaching effects on the implementation of policy. Accordingly, any strategy to protect biological diversity should consider the ethical conscience of the nation and take the necessary steps to inform the public of the ethical dilemmas inherent in the concept of extinction.[44] A

---

chauvinism," and a strong resistance to intrinsic evaluations. J. Baird Callicott, *On the Intrinsic Value of Nonhuman Species, in* THE PRESERVATION OF SPECIES, *supra* note 4, at 138, 164. *See also* Laurence H. Tribe, *Ways Not to Think About Plastic Trees: New Foundations for Environmental Law*, 83 YALE L.J. 1315 (1974) (arguing that homocentric tendencies tend to reduce environmental values to mere utilitarian values).

41. Consider, for example, the recent debacle over the snail darter, a subject which will be fully discussed in section III.C(2)(iii) of this note. *See infra* notes 117-19 and accompanying text. The eventual decision to construct the dam, despite the danger to the endangered population of this three-inch fish raises interesting issues. One commentator concludes that this episode suggests two observations: 1) there is a societal bias towards quantifiable benefits, especially critical human needs; and 2) the value of individual species is hard to measure, which tends to lower the risk of loss. *See* Stephen R. Kellert, *Social and Perceptual Factors in the Preservation of Animal Species, in* THE PRESERVATION OF SPECIES, *supra* note 4, at 50, 54. Kellert also presents one survey in which 3.6% of respondents reported that they would strongly approve the construction of a dam that would endanger a species of fish if the dam were being constructed for strictly recreational uses. If the purpose of the dam were to increase human drinking supplies, 18.6% of the respondents strongly favored construction. *Id.* at 55. Clearly, as the needs of humanity become more pertinent, the sting of intentionally exterminating a species of fish wanes.

42. For example, one study has noted that humanitarian concerns, represented by religious, medical, and social groups, dominate the distribution of charitable and governmental funds. Environmental causes trailed far behind in the drive for funding, receiving only 1.5% of the total amount distributed. Soulé, *supra* note 4, at 746. For a further discussion of these anthropocentric values in our culture, see BILL DEVALL & GEORGE SESSIONS, DEEP ECOLOGY 42-49 (1985) (arguing that our indifference towards nature may derive from Christian, capitalist, or patriarchal societal values).

43. In general, the animals receiving the greatest deal of attention under ESA protection are those which society finds most aesthetically pleasing, or those with a high utilitarian value. *See infra* notes 101-12 and accompanying text.

44. Some commentators contend that Christianity, and other religions, promote humankind as the supreme form of life on earth, and that other life forms are to be used for humankind's needs. *See, e.g.*, Lynn White Jr., *The Historical Roots of Ecologic Crisis*, 155 SCI. 1203 (1967) (arguing that Christianity, by eradicating paganism, has created a warped view of the relationship between humans and the environment). Consider, for example, this oft-quoted passage from the Bible:

> Then God said, "Let us make man in our image, after our likeness; and let them have dominion over the fish of the sea, and over the birds of the air, and over the cattle, and over all the earth, and over every creeping thing that creeps upon the earth."

Genesis 1:26.

lack of ethical arguments favoring the preservation of biological diversity cheapens the cause by reducing it to mere utilitarian terms, with all the concomitant problems of evaluating intangibles.[45]

The vast multitude of species and ecosystems have evolved over epochs of time. Indeed, the dawn of human civilization is a very recent event in the course of evolution.[46] We have no right to exterminate the vast multitude of creatures on earth in the interest of short-term economic gain.[47] Indeed, how can even long-term economic gain compare with millions of years of evolution? Moreover, one cannot overlook the ethical duty that is owed to future generations of humanity.[48] Our children and grandchildren deserve the opportunity to wonder at the majesty of elephants roaming the Serengeti. It will be a sad commentary on humanity if future generations can only experience such creatures in books and museums.

These are some of the most powerful justifications for preserving biological diversity. Unfortunately, fundamental changes in ethics take time and a great deal of education.[49] Accordingly, each of the preceding justifications must be explored if preservation of biological diversity is to be justified in light of the increasing marginalization of the world economy.

---

45. *See* Arne Naess, *Intrinsic Value: Will the Defenders of Nature Please Rise?*, *in* CONSERVATION BIOLOGY: THE SCIENCE OF SCARCITY AND DIVERSITY, (Michael E. Soulé ed., 1986) (stressing the need to go beyond mere utilitarian arguments by acknowledging the intrinsic value of nature). Specifically, Naess writes: "When biologists refrain from using the rich and flavorful language of their own spontaneous experience of all life forms . . . they support the value nihilism which is implicit in outrageous environmental policies." *Id.* at 512.

46. Most scholars would date human civilization back 7000 to 10,000 years at most. In contrast, life on earth has being evolving over millions of years. *See generally* EDWIN HARRIS COLBERT, EVOLUTION OF THE VERTEBRATES; A HISTORY OF THE BACKBONED ANIMALS THROUGH TIME (2d ed. 1969); ALEXANDER KINMONT, THE NATURAL HISTORY OF MAN AND THE RISE AND PROGRESS OF PHILOSOPHY (2d ed. 1891) (on the origin of the natural races of humankind).

47. *See* Norman Myers, *Biological Diversity and Global Security*, *in* ECOLOGY, ECONOMICS, ETHICS, *supra* note 2, at 11, 16. (stating that "humankind has no right to precipitate, through the elimination of large numbers of species, a fundamental and permanent shift in the course of evolution").

48. *See id.* at 21-23 (arguing that modern-day consumption is occurring at the expense of future generations).

49. *See* William M. Flevares, Note, *Ecosystems, Economics, and Ethics: Protecting Biological Diversity at Home and Abroad*, 65 S. CAL. L. REV. 2039 (1992) (exposing some of the attitudes that must change before biological diversity can be adequately preserved).

III. WHY ESA CANNOT ADEQUATELY PROTECT BIODIVERSITY

A. Biodiversity Was Not a Goal of ESA as It Was Originally Enacted

The main problem with implementing a plan to protect biodiversity is the inadequacy of the present federal structure. Legislation and agencies such as the National Environmental Policy Act (NEPA),[50] the Bureau of Land Management (BLM),[51] the National Forest Management Act (NFMA),[52] the National Park Service (NPS),[53] the Wilderness Act,[54] the Endangered Species Act (ESA),[55] and others all acknowledge biodiversity concerns, albeit that some only address the issue tangentially. This convoluted structure fails to adequately protect biodiversity. There is no national consensus of goals for biodiversity protection. This is reflected in the above listed statutes, which state goals that are only marginally related to the preservation of biodiversity.[56] In any event, it is clear that the present federal structure has several potentially conflicting goals, and that the preservation of biodiversity on federal lands will be cumbersome and largely ineffective under the current regime.[57]

---

50. 42 U.S.C. §§ 4231-4370(d) (1988 & Supp. 1992).

51. The agency was created by the Bureau of Land Management Organic Act, 43 U.S.C. §§ 1701-1784 (1988).

52. 16 U.S.C. §§ 1600-1687 (1988).

53. The agency was created by the National Park Service Act, 16 U.S.C. §§ 1-13, 17j-2, 22, 43 (1988).

54. 16 U.S.C. §§ 1131-1136 (1988).

55. 16 U.S.C. §§ 1531-1544 (1988).

56. Of the listed statutes, NEPA comes closest to a stated goal of biodiversity protection. Specifically, the purposes of NEPA are:

> To declare a national policy which will encourage productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; to enrich the understanding of the ecological systems and natural resources important to the Nation; and to establish a Council on Environmental Quality.

42 U.S.C. § 4321 (1988). Although the preservation of biodiversity clearly fits within the scope of this section, it is not the only goal that fits, and it may in fact be incompatible with some of the other aspirations of NEPA.

57. NEPA provides an excellent example of the inertia that retards preservation efforts. It took a court battle to resolve the issue of whether NEPA environmental impact statements should consider effects on biodiversity. *See* Marble Mt. Audobon Soc'y v. Rice, 914 F.2d 179, 182 (9th Cir. 1990) (holding that NEPA assessments must consider effects on biological diversity and on ecosystem as a whole). The ongoing saga of the northern

The main focus of biological preservation in the United States is, of course, ESA. However, a close analysis of ESA fails to reveal a congressional intent to preserve ecosystems as a whole. Rather, the emphasis is on the preservation of individual species,[58] or genetic diversity.

The only reference to ecosystems is in the critical habitat provisions of ESA.[59] As opposed to the designation of threatened[60] and endangered[61] species, critical habitat designations do not rely solely on scientific determinations. In this portion of the analysis, the administrator is directed to protect critical habitat "on the basis of the best scientific data available and after taking into consideration the economic impact, and any other relevant impact."[62] Moreover, the scientific factors that are considered in critical habitat designations focus on the needs of the individual species, not its entire ecosystem. Finally, the takings clause of ESA,[63] which makes it illegal to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect"[64] any listed species, applies only to the

---

spotted owl provides another example of how the competing goals of resource development and conservation slows down the process. For a complete discussion of the northern spotted owl controversy, see Elizabeth A. Foley, *The Tarnishing of an Environmental Jewel: The Endangered Species Act and the Northern Spotted Owl*, 8 J. LAND USE & ENVTL. L. 253 (1992). Nonetheless, challenges to protect biodiversity continue to be brought against various agencies under a growing number of environmental statutes. *See, e.g.*, Sierra Club v. Marita, 843 F. Supp. 1526, 1542-44 (E.D. Wis. 1994) (granting summary judgment against plaintiff's challenge of Forest Service plan as violating NFMA for inadequate biodiversity considerations); Sierra Club v. Robertson, 810 F. Supp. 1021, 1026 (W.D. Ark. 1992) (upholding Forest Service timber harvesting plan as properly managing the objectives of biodiversity preservation and long-term site productivity); Portland Audubon Soc'y v. Lujan, 795 F. Supp. 1489 (D. Or. 1992), *order modified in part* 1992 WL 176353 (D. Or. 1992), *aff'd*, 998 F.2d 705 (9th Cir. 1993) (holding that continued sale of timber in Northern spotted owl habitat by the Bureau of Land Management violated NEPA). *See generally* Ronald J. Rychlak, *Coastal Zone Management and the Search for Integration*, 40 DEPAUL L. REV. 981, 994-96 (1991) (detailing conflicting and redundant governmental requirements within the context of coastal zone management).

58. ESA defines "species" as "any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife which interbreeds when mature." 16 U.S.C. § 1532(16) (1988).

59. 16 U.S.C. § 1533(b)(2) (1988).

60. "Threatened species" is defined as "any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range." 16 U.S.C. § 1532(20) (1988).

61. "Endangered species" is defined as any species "which is in danger of extinction throughout all or a significant portion of its range." 16 U.S.C. § 1532(6) (1988).

62. 16 U.S.C. § 1533(b)(2) (1988).

63. 16 U.S.C. § 1538 (1988).

64. 16 U.S.C. § 1532(19) (1988).

individual species, and not to any other species that may happen to be present in the listed species' critical habitat. Hypothetically, this could include its imperiled (but not listed) food source.

Thus, it is clear that the protection of biodiversity was not a consideration of the original drafters of ESA and is not addressed directly or effectively by other national environmental laws. At most, it appears as an afterthought in the critical habitat provisions of ESA which provide only haphazard and "economically justified" protections for biodiversity. Some would argue that the current version of ESA is an adequate structure to preserve biodiversity, regardless of the original mandate of the Act.[65] Unfortunately, the abysmal record of ESA protection measures in the United States do not support this contention.

B. The Track Record

A quick review of ESA action since its promulgation in 1973 reveals that it has failed to adequately protect genetic diversity, let alone ecosystem diversity. Over 650 species have been officially listed[66] as either endangered or threatened, and over 3900 species remain candidates for listing.[67] In light of the current federal budget crisis, it seems unlikely that ESA will obtain more funds to accelerate the listing process.

The more prudent alternative would be to spend current funds more wisely. Under the present system the bulk of the recovery funds go toward high-profile species, such as the California condor, the bald eagle, and the Florida panther.[68] This distortion in funding neglects the unknown and less-popular of the listed species, as well as the vast multitude of candidate species waiting for a final determination of their status. Unfortunately, the dilemma of inadequate and inefficient funding is further compounded by the problems of delay and inaction. The United States Fish and Wildlife

---

65. *See infra* notes 178-81 and accompanying text (discussing two commentators who argue that ESA is the most viable means of preserving biodiversity).

66. Ann Gibbons, *Mission Impossible: Saving All Endangered Species*, 256 SCIENCE 1386, 1386 (1992).

67. U.S. GENERAL ACCOUNTING OFFICE, ENDANGERED SPECIES: MANAGEMENT IMPROVEMENTS COULD ENHANCE RECOVERY PROGRAM (GAO RCED 89-5, 1988) [hereinafter U.S. GENERAL ACCOUNTING OFFICE].

68. Virginia S. Albrecht & Thomas C. Jackson, *Battle Heats Up as Congress Begins Review of Endangered Species Act*, NAT'L L.J., May 18, 1992 at S1, S2. Another commentator notes that in 1990, $30 million was spent on just four species: the grizzly bear, the Northern spotted owl, the least Bell's vireo, and the red-cockaded woodpecker. Gibbons, *supra* note 66, at 1386.

Service (FWS) estimates that 255 days should be ample time to take a species through the entire ESA process, from petition for review all the way to final listing in the Federal Register.[69] In practice, however, the entire listing process averages nearly two years for each candidate species.[70] Some candidate species have become extinct while waiting for this cumbersome process to run its course.[71] As a result of these problems of funding and delay, and others that will be discussed in the following sections of this Note,[72] only five species have been removed from ESA's listing protections and deemed fully recovered.[73]

These numbers implicate ESA as a failure in its goal to preserve genetic diversity.[74] Assuming, arguendo, that another goal of ESA is the protection of biodiversity as a whole, it is quite obvious that ESA has failed miserably here as well. Indeed, critical habitat designations can be just as controversial and time-consuming as the listing process.[75] Moreover, critical habitat designations do not occur until a species is declared to be endangered.[76] Considering that the average listing takes nearly two years to complete, coupled with the fact that the species would most likely not be endangered in the first place if its habitat were not imperiled, it is obvious that the reactive nature of ESA cannot adequately respond to threats to biological systems as a whole.[77] We should take heed

---

69. STEVEN L. YAFFEE, PROHIBITIVE POLICY: IMPLEMENTING THE FEDERAL ENDANGERED SPECIES ACT 64 (1982).

70. *Id.*

71. Examples include several species of goldenrod, foxglove, and watercress. Gibbons, *supra* note 66, at 1386.

72. *See infra* notes 82-161 and accompanying text.

73. Moreover, the removal of some of these species was due to the discovery of previously unknown populations, and not the result of ESA protection. Michael J. Bean, *Taking Stock: The Endangered Species Act in the Eye of a Growing Storm*, 13 PUB. LAND L. REV. 77, 77 (1992). One of the rare success stories of ESA is the American alligator. *See* James Conaway, *Eastern Wildlife: Bittersweet Success*, NAT'L GEOGRAPHIC, Feb. 1992, at 66, 87 (noting that the alligator was first listed in 1967, and ten years later, the population had climbed to nearly two million).

74. *But see* Bean, *supra* note 73, at 77 (arguing that ESA's record is not as abysmal as many critics claim).

75. One obvious example of the potential for excruciating delay and debate over critical habitat designations is the current controversy surrounding the northern spotted owl. For an excellent account of this debate and the effect that it will have on future ESA determinations, see *supra* note 57. The Northern spotted owl debate is also considered more extensively in this Note. *See infra* notes 97-100 and accompanying text.

76. 16 U.S.C. § 1533(a)(1) (1988).

77. *See* Lucy T. Rudbach, *A Strategy to Preserve Biological Diversity: Marble Mountain Audubon Society v. Rice*, 13 PUB. LAND L. REV. 193, 205 (1992) (arguing that ESA

of Michael Soulé's warning that "[i]n conservation, dithering and endangering are often related."[78]

Moreover, the short-comings of an ESA-type approach are exacerbated when transferred to an international scale.[79] Persistent problems of inadequate and inefficient funding and delay can be magnified in other nations. For example, the greatest concentration of the world's biota is located in the tropical rainforests,[80] most of which occur within the boundaries of Third World countries.[81] These countries hold enormous reserves of biological wealth, but, due to chronic poverty, are the least likely candidates to preserve it. If the United States is to become a leader in efforts to preserve biodiversity, we must devise a plan that is more cost-effective and less time-consuming than the current scheme of protection. We must do so not only to better protect our own biological resources, but also to create a feasible model for the preservation of imperiled ecosystems throughout the world.

C. *Post-Mortem: The Reasons Behind ESA's Failure to Protect Genetic Diversity*

1. The Reactive Nature of ESA

The overly-reactive nature of ESA is a function of two variables: a lack of adequate funding and the reliance on an "endangered" or "threatened" listing determination as a trigger for action. The reasons and consequences of inadequate funding are discussed in the preceding section of this Note.[82] Funding deficiencies are

---

cannot protect biodiversity because the listing process is too burdensome and the reactive nature of ESA is an inefficient, indirect means). *See also* Mark Shaffer, *Minimum Viable Populations: Coping with Uncertainty, in* VIABLE POPULATIONS FOR CONSERVATION 69 (Michael E. Soulé ed., 1987) (noting that by the time a species goes through the entire listing process, most of its critical habitat will be gone).

78. CONSERVATION BIOLOGY, *supra* note 45, at 7.

79. *See, e.g.*, Hajo Versteeg, *The Protection of Endangered Species: A Canadian Perspective*, 11 ECOLOGY L.Q. 267 (1984) (noting that a similar Canadian system of preservation has the same inherent pitfalls of ESA, in that the Canadian system is also overly reactive and nonscientific).

80. *See supra* note 2 (discussing the biological diversity on earth and noting in particular the large concentration of biota in the tropical rain forests).

81. The vast majority of the world's remaining tropical rainforests are to be found in South America and West Africa. *See* JOHN NICHOL, THE MIGHTY RAINFOREST 23 (1990) (noting that the tropical rainforests of the world form a ring around the equator, although much of this ring has already been broken).

82. *See supra* notes 68-73 and accompanying text (discussing the bureaucratic FWS listing process and how scarce dollars are spent primarily on high profile species).

exacerbated by ESA's reliance on the listing process for agency action, which also presents several problems of its own.

First, attacks on the listing process and the designation of critical habitat through administrative or court proceedings are some of the favored delaying tactics of industry, representing one of the major causes of the reactive nature of ESA.[83] Frequently, the industry seeking to delay the process is one which has considerable land holdings for development or resource extraction purposes, such as the timber industry. As an industry succeeds in delaying the process, a potentially endangered species will continue to dwindle, as will its critical habitat.[84] Indeed, some species have become extinct while waiting for these types of battles to be thrashed out.[85] Thus, an industry can achieve its objective of avoiding a listing and critical habitat designation by delaying the agency action to the point where the species is completely eradicated and the issue becomes moot.

Waiting for an individual species to become endangered or threatened presents a second set of difficulties. By the time the reactive mechanics of ESA are set into motion, a species is often already on the brink of extinction. As noted earlier, such a highly endangered species will often have little natural habitat left in which to recover. Moreover, even if a viable tract of habitat remains, a species' numbers may be so depleted as to preclude any realistic chance of recovery.[86] In addition, bringing a species back from the brink of extinction entails much higher costs than that of managing a viable population before it becomes threatened or endangered.[87] As a consequence, more funding will be allocated to

---

83. Consider, for example, the ongoing debate over the Northern spotted owl. For a detailed discussion of the timber industry's attempts at delaying the preservation process, see Foley, *supra* note 57, at 267 (FWS committee designated to investigate the Northern spotted owl listing and critical habitat designation was established in 1989, yet a final ruling was delayed until 1992).

84. *See* Shaffer, *supra* note 77, at 69 (by the time a species goes through the entire ESA process, its critical habitat may be entirely destroyed). *See also* Rudbach, *supra* note 77, at 205 (discussing how the process of listing a species is burdensome and causes detrimental delays).

85. Some examples include several species of goldenrod, foxglove, and watercress. Gibbons, *supra* note 66, at 1386.

86. Consider, for example, the California condor and the Florida panther, two species with less than 100 individuals remaining. Recovery from such low numbers will take decades, and is subject to such problems as inbreeding, disease, and natural catastrophe. Michael E. Gilpin, *Spatial Structure and Population Vulnerability, in* VIABLE POPULATION FOR CONSERVATION 124, 132-34 (1987). For a detailed discussion of the problems of the California condor recovery program, see *infra* notes 105-07 and accompanying text.

87. A detailed discussion of the economic costs entailed by the preservation of serious-

fewer species, many of which may never recover, due to dwindling habitat, minimal population numbers, or both.

2. ESA Has Minimal Foundation in Scientific Principles

Science is often considered to be wholly objective, the paradigm of rational, emotionally-detached decisionmaking.[88] Yet, this view of scientific processes is not entirely accurate, and may be the product of a general misunderstanding by the courts and the public in general.[89] This misconception of scientific decisionmaking is embodied in ESA, which mandates that listing determinations be based solely on "scientific and commercial data."[90] Blind reliance on the supposedly rational and detached decisionmaking of science in ESA listing procedures acts as a screen for the nonscientific factors that must and inevitably will permeate any scientific decision, such as biases, political considerations, and public perceptions.[91]

These nonscientific factors are even more prevalent in the science of conservation biology.[92] This is due to the fact that the decisionmaking process of conservation measures does not lend itself to the full development of scientific data. Indeed, the sheer magnitude of the crisis and the need for immediate responses mandate agency action before the complete collection of data and its analysis, assuming that it could in fact be analyzed.[93] Furthermore,

---

ly endangered genetic diversity, as opposed to the costs of preserving biologically diverse or unique ecosystems, is provided in section V(A)(2) of this Note. *See infra* text accompanying notes 184-92 (explaining how preservation of biodiversity is more cost-effective than a species-by-species approach).

88. *See, e.g.*, Richardson v. Perales, 402 U.S. 389, 405 (1971) (noting the traditional court reliance on arguments of reliability and probative worth in finding that standard medical reports were unbiased and wholly objective).

89. Robert J. Taylor, *Biological Uncertainty in the Endangered Species Act*, 8 NAT'L RESOURCES & ENVT. 6, 6 (Summer 1993) (stating that "[f]or years the political community regarded the scientific community as an impenetrable but useful black box that swallowed money and bright young people and regurgitated truth and clever gadgets").

90. 16 U.S.C. § 1533(b)(1)(A) (1988).

91. *See infra* notes 101-12, 121-30 and accompanying text (discussing how public perceptions, social policy considerations, and politics strongly influence the supposedly rational and objective scientific process).

92. For an interesting history of the development of micro and macro taxonomy as applied in conservation biology today, see generally ERNST MAYR, THE GROWTH OF BIOLOGICAL THOUGHT: DIVERSITY, EVOLUTION AND INHERITANCE (1982) (tracing the evolution of these concepts from Aristotle to the present day).

93. Michael Soulé calls this science a "crisis discipline," due to the need for action in the absence of complete scientific data. He restates the problem as "the Nero dilemma:" we must act quickly, or Rome will be in ashes. CONSERVATION BIOLOGY, *supra* note 45,

scientific conclusions are often in a state of flux, and can change as new evidence is discovered or new methodologies are implemented.[94]

Even if agency decisions fully considered all the relevant scientific data, the influence of nonscientific factors is unavoidable. The power of ideologies is one such factor. Scientists are only human, and are inescapably influenced by their own life experiences and viewpoints.[95] Thus, industry-supported scientists may be driven by different ideologies than government scientists or environmentalists. This can result in diametrically opposed conclusions on the same set of facts.

Moreover, scientists working within an agency context are not immune from the nonscientific influences of resource constraints, conflicting organizational goals, scientific conservatism, political accountability, advocates and lobbyists, and the media.[96] Consider, once again, the controversy over the northern spotted owl. At one point in the process, the FWS decided not to list the owl as endangered or threatened under ESA. This ruling was challenged in *Northern Spotted Owl v. Hodel*.[97] The court ruled that FWS had acted arbitrarily and capriciously in deciding not to list the northern spotted owl under ESA, despite unanimous scientific support in favor of a listing.[98] The FWS findings concerning the status of the northern spotted owl are an excellent example of the manner in which ostensibly scientific conclusions can be distorted or mischaracterized to fit within an agency's agenda. The court in

---

at 6-7.

94. *See* MAYR, *supra* note 92, at 832 (flexibility is a characteristic of good science; scientists must be able to change assumptions and theories to comply with new evidence).

95. Mayr presents the theory of evolution as an example of the power of ideologies. Consider two scientists observing the same set of facts concerning the adaptation of insects for plant pollination. One scientist, a firm believer in a divine being and opposed to Darwinian thinking, may interpret such objective factual evidence as an indication of the wisdom of the creator. A second scientist, holding to Darwinian views of evolution, may observe these same facts as evidence of natural selection. *Id.* at 834. Yaffee notes that the personal and professional values of a scientist can affect his or her analysis of data. For example, eight out of fourteen domestic fish species that have been added to the ESA list of species are located in the southeastern United States. It should not be surprising that the staff ichthyologist at the FWS had been the head of the Alabama Conservancy and is an expert on southeastern fish species. YAFFEE, *supra* note 69, at 72.

96. For a complete discussion of these factors in the scientific decisionmaking context, see YAFFEE, *supra* note 69, chs. 7-8.

97. 716 F. Supp. 479 (W.D. Wash. 1988). *See also* Foley, *supra* note 57 (providing a complete history on the battle over the Northern spotted owl).

98. 716 F. Supp. at 483.

Hodel noted that the only FWS reference to an expert opinion was seriously mischaracterized.[99] Indeed, this expert, Dr. Mark Boyce, testified that he did not support the FWS interpretation of his findings and would be very disappointed if his work were used to hamper efforts to save the owl from extinction.[100]

It would also be naive to believe that scientists operate in a political vacuum, free of outside influences and the voices of their own thoughts and beliefs. This is especially true within the context of accelerated agency decisionmaking. The following sections detail specific external influences on ESA scientific decisionmaking.

a. Public Perceptions: Effects on Agency Funding and Prioritization

The effects of public perceptions on agency decisionmaking processes are wide ranging and pervasive. This should come as no surprise, as an agency must be responsive to public constituencies in order to avoid political backlash and reduced funding.[101] As a result, the public plays a large role in determining which species receive attention and which are neglected, with scientific data playing a somewhat lesser role.[102] The effect of public perceptions on agency behavior can be enormous, and has had a direct effect on the prioritization of species within the FWS listing procedure.[103]

---

99. *Id.* at 482 (discounting the FWS interpretation of the testimony of Dr. Mark Boyce).

100. *Id.*

101. FWS officials have commented that

> The need to achieve a positive public perception of the program sometimes drives the agency to devote extra attention to species with high "public appeal" . . . . Such decisions, in effect, divert funds from those species "with the highest degree of threat" that are supposed to receive priority attention under FWS' priority system.

U.S. GENERAL ACCOUNTING OFFICE, *supra* note 67.

102. *Id.*

103. One commentator notes that FWS follows an informal hierarchy of sorts, with mammals and birds at the top of the list and invertebrates and plants at the bottom of the prioritization list. FWS actually proposed this sort of hierarchy as a formal agency policy, but eventually disregarded the idea. *See* Dennis D. Murphy, *Invertebrate Conservation, in* BALANCING ON THE BRINK OF EXTINCTION: THE ENDANGERED SPECIES ACT AND LESSONS FOR THE FUTURE 181, 185 (Kathryn A. Kohm ed., 1991) (arguing that invertebrates do not receive adequate protection under ESA due to public perceptions). Moreover, a look at the distribution of funds within FWS reveals a general bias towards popular species. "In 1990, nearly $30 million was spent on just four species: the northern spotted owl, the grizzly, the least Bell's vireo, and the red-cockaded woodpecker." Gibbons, *supra* note 66, at 1386. In the meantime, less interesting species, such as certain species of

In general, species that are viewed favorably in the public eye stand the best chance of survival under the present scheme.[104] Consider, for example, the California condor, a bird that has teetered on the brink of extinction for most of this century. Indeed, every surviving member of the species has been removed from the wild as part of an extremely expensive and controversial captive breeding program.[105] Yet, the majority of the scientific evidence points to the fact that the California condor has been in a long evolutionary decline, irrespective of human activities.[106] Evidently, the public desire to preserve a majestic bird, the largest bird on the continent, outweighed any countervailing scientific or budgetary considerations.[107]

Species that are scorned by the public generally fare worse in the fight for survival. The wolf is an example of such a creature. It has been feared and misunderstood, due largely to societal tradition and folklore.[108] Not surprisingly, these public perceptions,

---

goldenrod, foxglove, and watercress, have become extinct while waiting for attention. *Id.*

104. The inescapable human affinity for "cute" creatures and those that share similar traits with humans is explored in Susan M. Schectman, *The "Bambi Syndrome:" How NEPA's Public Participation in Wildlife Management is Hurting the Environment,* 8 ENVTL. L. 611 (1978).

105. The captive breeding program costs approximately $1 million a year to run. Scott et al., *supra* note 16, at 784. For an enlightening discussion on the natural history of the California condor and current efforts to preserve it, see ROGER L. DISILVESTRO, THE ENDANGERED KINGDOM 127-44 (1989).

106. Biologists believe that the California condor has been on the decline since the end of the last ice age. Biologists speculate that as the large mammals of the continent disappeared, the condor lost major food sources. As a result, the bird was restricted to the west coast of the continent by the time Columbus arrived in America. DISILVESTRO, *supra* note 105, at 128-30.

107. The first FWS condor recovery plan was implemented in 1975, having an announced goal of a stable population of only 50 birds. *Id.* at 135. A population of only 50 birds can hardly be considered biologically stable. Rather, it can be argued that a population of 50 birds would be enough to satisfy the public interest.

108. Stereotypical treatment of wolves as bloodthirsty beasts is a familiar theme in Western society. Consider the following Shakespearean passage in which a Grecian prince laments the factionalism of his army. He opines on the human power struggle as follows: "Power into will, will into appetite;/ And appetite, an universal wolf,/ So doubly seconded with will and power,/ Must make perforce an universal prey,/ And last eat up himself." WILLIAM SHAKESPEARE, TROLIUS AND CRESSIDA, act 1, sc.3, lns.120-24. Jack London uses similar imagery in a shaman's description of a white man intruding on traditional northern tribal culture as "the child of the Wolf, or in other words, the Devil." JACK LONDON, *The Son Of The Wolf, in* THE COLLECTED JACK LONDON 39, 44 (Steven J. Kasdin ed., 1991). *See also* CLARISSA PINKOLA ESTES, WOMEN WHO RUN WITH THE WOLVES: MYTHS AND STORIES OF THE WILD WOMAN ARCHETYPE 4 (1992) (drawing the analogy between the historical treatment of wolves and women: both have been harassed and stereotyped as devouring and devious creatures).

coupled with economically influential ranching and agricultural interests, have played an enormous historical role in the exploitation and preservation of the wolf.[109] Fortunately for the wolf, public attitudes are beginning to change. Recent efforts to save the wolf and to bring it back to parts of its former range, such as Yellowstone National Park, are a reflection of changing public attitudes towards the wolf.[110] As the public overcomes its historical fear of the wolf, its chances of recovery are greatly enhanced.

Thus, it is clear that the public has its own sort of prioritization system in determining which species are worthy of preservation in light of the economic costs involved.[111] An understanding of these perceptual factors is vital to the success of any program to preserve biological diversity. Without the support of the public, agencies will not function, and funding will go toward other projects.[112] Yet it is equally clear that public perceptions must change in order to better reflect the scientific and economic justifications for preserving the diversity of life. Such changes do not occur overnight; they are the result of increased awareness and

---

109. *See* Todd, *supra* note 31, at 464-65 (noting that the traditional perception of hatred and fear of the wolf is reflected in the historical lay, scientific, and governmental treatment of wolves). Theodore Roosevelt, one of the most prominent conservationists of the early 20th century, called the wolf the "beast of waste and desolation." THOMAS R. DUNLOP, SAVING AMERICA'S WILDLIFE 16 (1988).

110. Todd, *supra* note 31, at 464-65 (arguing that changes in scientific thinking and public perceptions are reflected in the changing government policies towards wolf preservation).

111. One commentator argues that the public's willingness to protect species depends on four factors: 1) potential benefits to humanity; 2) anthropomorphic factors, such as cuteness, likeness to humans, ability to feel pain; 3) rarity and contribution to diversity; and 4) aesthetics, symbolism, and religious values. Kellert, *supra* note 41, at 62. As an example, one of Kellert's surveys considered public attitudes towards modifying an energy project to protect selected endangered species. For an endangered spider, 4.7% of respondents reported that they would strongly favor conservation efforts. For the bald eagle, the number of respondents strongly favoring conservation was 43.9%. *Id.* at 57. *See also* YAFFEE, *supra* note 69, at 133 ("Value is implicitly assigned to species based on . . . social metaphors, their evolutionary closeness, their utility as products, their aesthetic appeal, and the degree of threat they present to humans."); *see generally* Schectman, *supra* note 104 (discussing the impact of disproportionate media attention and public eduction and spending on "cute" endangered species).

112. The functioning and survival of agencies is inextricably intertwined with public perceptions. Indeed, one commentator concludes that "[t]he success of a program of public risk management depends on its acceptance by the public. EPA therefore must educate itself about public perception of risk at the same time that it seeks to enhance the public's understanding of the agency's perspective." Richard J. Lazarus, *The Tragedy of Distrust in the Implementation of Federal Environmental Law*, 54 LAW & CONTEMP. PROBS. 311, 373 (1991).

education.

b. Constituencies

As a general rule, species that manage to fall within the good graces of a prominent environmental organization tend to receive a greater deal of protection under ESA. In essence, environmental organizations are the lobbyist arm of public perceptions and taste. Their funding and very existence relies upon the general public for support. Consequently, they act as a powerful voice of public opinion. Unfortunately, some of the less popular species generate little public attention and accordingly receive minimal support from organized constituencies. These species generally receive less attention from the FWS under ESA.[113] Ironically, some of these less-charismatic species have provided some of the largest benefits for humanity.[114] Yet, a lack of public support and influential constituencies has led to their neglect under FWS conservation efforts.[115]

c. The Media

The problems of public perceptions tend to crystallize in the media. Not only does the media solidify public perceptions on an issue, it can also manipulate public perceptions, depending on how an event is portrayed to the public.[116]

Consider the controversy between the snail darter and the Tennessee Valley Authority (TVA). In a classic battle between preservationists and economic interests, the media billed the controversy as a three-inch fish versus an $80 million dam project.[117] In

---

113. Consider, for example, the invertebrates, which have received only nominal support from FWS. Only one organization, the Xerces Society, is dedicated to their preservation. Murphy, *supra* note 103, at 185. *See also* Kellert, *supra* note 41, at 57 (because invertebrates are not aesthetically pleasing and are not perceived to feel pain, their public value is relatively low).

114. *See supra* notes 22-26 and accompanying text (discussing medicinal benefits of biodiversity).

115. An exception to this rule occurs when a particular administrator has an interest in these species. *See supra* note 95 and accompanying text.

116. YAFFEE, *supra* note 69, at 142.

117. For example, consider the following excerpt from a newspaper column reflecting on the epic battle: "The Endangered Species Act has often been ridiculed; it has lent itself to caricature. An entire dam is held up by a three-inch fish, the snail darter, that no one cares about or had even heard of before." *The Pacific Salmon Decision,* WASH. POST., April 17, 1992, at A22. The Northern spotted owl may become another symbol of the battle, and one publication has likened it to the snail darter, "only cuter." *Environment's Little Big Bird: Logging Endangers Spotted Owl,* TIME, April 16, 1990, at 21, 21.

so doing, the battle lines were sharpened, and a unique habitat was lost in the shuffle.[118] In light of this media portrayal, it is no wonder that the snail darter eventually lost its battle for protection under ESA.[119]

The media tends to generalize issues into forms that are easily accepted by the public and that spark controversy (and hence sell papers).[120] As a result, popular species, such as the bald eagle, are glorified, as are efforts to preserve these species. On the other hand, unknown or uncharismatic species are vilified by the media, resulting in a reduced effort to save this group of species.

d. Politics

Politics has been dubbed "the art of the possible" and the appellation fits well within the context of endangered species protection. The scientific data concerning endangered species is often incomplete and uncertain. As a consequence, politics can enter into the equation in a rather inconspicuous manner and tends to be somewhat shielded by the scientific data.[121] This smokescreen can allow politics to exert great force over the process. Indeed, the fear of political backlash can lead an agency to delay a listing or critical habitat designation, ostensibly on scientific grounds.[122]

---

118. *See* Zygmunt J.B. Plater, *In the Wake of the Snail Darter Controversy: An Environmental Law Paradigm and its Consequences,* 19 U. M. J. L. REF. 805 (1986) (discussing the media implications of the controversy and the effects that the eventual outcome will have on conservation efforts in the United States). Moreover, the media neglected to consider several other regional interests, such as family farms and Indian archaeological sites. *See* George C. Coggins & Irma S. Russell, *Beyond Shooting Snail Darters in Pork Barrels: Endangered Species and Land Use in America,* 70 GEO. L.J. 1433, 1495 (1982) (noting that even the ESC found that completion of the TVA dam was not in the best interests of the public).

119. For a detailed discussion on the snail darter controversy, see *infra* notes 139-46 and accompanying text.

120. Yaffee argues that the media tends to follow four models in its reports on ESA conflicts, depending on the public perception of the species: 1) greedy developer vs. innocent species; 2) confused, inefficient bureaucracy vs. innocent species; 3) overzealous environmentalist vs. economic progress; and 4) honest bureaucrat/citizen trying to do a good job against all odds. YAFFEE, *supra* note 69, at 142.

121. Moreover, politics often works in favor of industrial interests, and against the forces of change embodied in the environmental movement. *See* Melanie J. Rowland, *Bargaining for Life: Protecting Biodiversity Through Mediated Agreements,* 22 ENVTL. L. 503, 512 (1992) ("In politics, uncertainty tends to support the status quo, and thus tends to work against conservationists.").

122. *See* YAFFEE, *supra* note 69, at 87-88 (exploring the effects of hot political topics on agency behavior). *See also* Northern Spotted Owl v. Hodel, 716 F. Supp. 479, 483 (W.D. Wash 1989) (finding agency decision to delay listing of the owl due to lack of

The listing of the Minnesota population of wolves provides an excellent example of this phenomenon. The wolves were originally listed as endangered in 1973, much to the chagrin of livestock owners and game hunters.[123] Some of the more radical opponents of the listing went so far as to deliver the carcasses of illegally killed wolves to the doorsteps of newspaper editors and legislators.[124] In a move largely to assuage the local interests, the FWS downgraded the Minnesota wolf to "threatened" in 1978.[125] The Yellowstone grizzly bear provides another example of a species that conflicts with local economic and political interests. In this instance, the National Park Service had compiled a substantial amount of scientific evidence which tended to support a decision to remove a campground within prime grizzly habitat as overly burdensome on the bears' habitat.[126] The chamber of commerce of Cody, Wyoming and Senators Alan Simpson and Malcolm Wallop were not quite so enamored by the scientific data. As a result of their pressure, the Park Service re-reviewed the data and decided to maintain the status quo.[127] The National Wildlife Federation challenged this action as arbitrary and capricious in *National Wildlife Federation v. National Park Service*,[128] but the court deferred to the agency's scientific conclusions.[129]

Political influences are not necessarily a contemptible phenomenon, especially when they occur within the framework of a democratic society. Agency decisions should in fact account for social policy and the concerns of the polity as a whole. However, when science is used as a mask for political manipulation, the process becomes distorted and subject to abuse.[130] Science should never

---

scientific evidence an arbitrary and capricious action).

123. *See* DISILVESTRO, *supra* note 105, at 97-108 (detailing the battle as it took shape between wolf conservationists and economic interests).

124. *Id.* at 97.

125. *Id.*

126. *See* David P. Sheldon, *A Threatening Turn for a Threatened Species: The Impact of National Wildlife Federation v. National Park Service*, 10 PUB. LAND L. REV. 157, 159-64 (1989) (exploring the conflicting interests within Yellowstone and the battle to preserve the grizzly bear within the park).

127. *Id.*

128. 669 F. Supp. 384 (D. Wyo. 1987).

129. *Id.* at 392. For a complete review of this episode, see Sheldon, *supra* note 126, (criticizing the court's decision as unduly deferential to the agency decisionmaking process).

130. *See* Taylor, *supra* note 89, at 6 (arguing that while science should be influenced by social policy, when science is used to support short-term political and bureaucratic goals, the scientific process is flawed).

be used as a cover for local political interests, in light of the broad societal interests in question.

e. ESA Has Become a Battleground for Other Environmental Debates

The 1969 predecessor to the present enactment of ESA required a threat of "worldwide" extinction of a species before the provisions of the Act would become operative.[131] Congress amended the 1969 Act by removing this requirement, and consequently moved towards a system of protection for both globally imperiled and locally isolated species.[132] Unfortunately, this broad scope of ESA protections has proved to be a fertile battleground for other environmental debates.

Indeed, it would seem that the goal of protecting genetic diversity is not furthered by efforts to safeguard small populations within our own boundaries, when the species is known to be flourishing in other areas of the world. Consider, for example, the Minnesota population of wolves. Its numbers are in fact low within the state of Minnesota, yet the wolf still thrives in Canada and Alaska.[133] This is not a battle to save a truly endangered species, rather, it seems to be a battle over land use.[134] Although Congress did specifically endorse this approach to conservation by enacting the more expansive version of ESA that exists today, preservation of isolated species can lead to a distortion of ESA's goals. As a result, ESA can be manipulated to suit the broad-based agendas of environmentalists.[135] Allowing ESA to become a bat-

131. The Endangered Species Conservation Act of 1969, 16 U.S.C. § 668aa (repealed 1973).

132. ESA defines threatened and endangered species as ones that are threatened with extinction in a significant portion of their range, and not necessarily throughout its entire range. 16 U.S.C. §§ 1532(6), (20); *see also* YAFFEE, *supra* note 69, at 62 (arguing that the removal of the "worldwide" extinction as a prerequisite to action was an effort to expand ESA protections to locally isolated species).

133. The Canadian population of wolves alone numbers nearly 50,000, up from a population of 28,000 just 20 years ago. Jeffrey P. Cohn, *Endangered Wolf Population Increases*, 40 BIOSCIENCE 628, 629 (1990) (noting the increase in wolf population in Italy and Poland).

134. One author calls these "pseudoendangered" species, as they are used as surrogates for other environmental debates. *See* Taylor, *supra* note 89, at 58 (listing other species consisting of a fringe U.S. population as the grizzly and the snail kite). *See also* G.M. Bush, *Builders Threaten Suit Over Endangered Bird*, L.A. DAILY JOURNAL, Oct. 31, 1991, at 4 (attorney representing the builders noted the fact that supposedly endangered California gnatcatcher thrives in Baja, California, with an estimated population of 3 million).

135. *See* Taylor, *supra* note 89, at 58-59 (noting that amending the ESA will subject

tleground for other debates only serves to expose it to political and public debate and to divert much needed funding into projects of little scientific value. This trend should be reversed, and a clearer statement of ESA's goals should be promulgated.

f. Conflicting State Recovery Plans

Just as species do not respect international boundaries, they are equally oblivious to state boundaries. Yet, ESA currently allows each state to promulgate its own recovery plan for each species.[136] Unfortunately, it is not reasonable to expect that each state will promulgate comparable and compatible recovery plans. Indeed, each plan will undoubtedly reflect local political and public perceptions, as discussed above.[137] The resulting hodgepodge of protections ultimately can fragment populations and hamper recovery efforts.[138]

3. Explicit Circumvention of ESA Protections

The scientific conclusions and data compiled under ESA actions also can be openly disregarded in certain circumstances. In the following two procedures, Congress and/or an agency makes an explicit decision to forgo protection measures, despite any scientific data that would support a conclusion to the contrary. Both are the result of a battle over a three-inch fish, further exposing the pitfalls of ESA's genetic diversity approach to the preservation of biological resources.

a. The God Squad

The Endangered Species Committee (ESC), better known as "the God squad,"[139] represents a further weakening of the scientific grounding of ESA. This time, however, subjugation of ESA's goals occurred explicitly and has been codified in the 1978 amend-

---

the Act to increased political scrutiny).

136. 16 U.S.C. § 1535(c) (1988).

137. *See supra* notes 123-29 and accompanying text (discussing the influence of local politics on FWS classification of specific species).

138. *See* Taylor, *supra* note 89, at 6 (concluding that ESA policy fails in that it makes no effort to reconcile political boundaries with biological boundaries).

139. For an interesting discussion on the history and operations of the ESC, see Jared des Rosiers, Note, *The Exemption Process Under the Endangered Species Act: How the "God Squad" Works and Why*, 66 NOTRE DAME L. REV. 825 (1991).

ment to ESA.[140] Specifically, the God squad is an effort to better weigh the costs and benefits of protecting any particular species.[141] It was created in response to the epic battle between the snail darter and an $80 million dam project.

The snail darter controversy may be the highwater mark for conservation efforts in the United States. It began when biologists discovered that the snail darter, a rather inconspicuous, three-inch fish endemic to several rivers in Tennessee, inhabited a small river that was about to be inundated by a nearly completed dam project. Environmentalists brought suit to halt the dam project, which culminated in *TVA v. Hill*,[142] in which the Supreme Court of the United States held that ESA was to be interpreted as offering protection to any species that was endangered, regardless of the economic costs.[143]

Subsequent events would turn *TVA v. Hill* into a pyrrhic victory for the environmentalists. While the ruling did achieve the goal of halting construction of the dam, it also exposed the inflexibility of ESA, and the potential magnitude of economic displacement that could result from a literal interpretation of the Act's provisions. In response to such dire economic possibilities, Congress amended ESA in 1978, and the ESC was created.[144] Ironically, the ESC studied all of the socio-economic factors at stake in the TVA project and still ruled in favor of protecting the snail darter.[145] This

---

140. *See id.* (describing the creation of the 1978 amendment to ESA).

141. 16 U.S.C. § 1536(h)(1)(A) (1988). Sections (A) and (B) of the amendment list the criteria to be used in the cost/benefit analysis as follows:

> (i) there are no reasonable and prudent alternatives to the agency action;
> (ii) the benefits of such action clearly outweigh the benefits of alternative courses of action consistent with conserving the species or its critical habitat, and such action is in the public interest;
> (iii) the action is of regional or national significance; and
> (iv) neither the Federal agency concerned nor the exemption applicant made any irreversible or irretrievable commitment of resources prohibited by subsection (d) of this section; and
>
> (B) it establishes such reasonable mitigation and enhancement measures, including, but not limited to, live propagation, transplantation, and habitat acquisition and improvement, as are necessary and appropriate to minimize the adverse effects of the agency action upon the endangered species, threatened species, or critical habitat concerned.

142. 437 U.S. 153 (1978).

143. *Id.* at 194 (holding that ESA does not require balancing of equities).

144. 16 U.S.C. § 1536(e) (1988).

145. *See* EHRLICH & EHRLICH, *supra* note 28, at 221 (exploring the factors that the

favorable ruling has led some to argue that the so-called God squad has not weakened ESA protections.[146]

This optimism should be tempered, however, by recent ESC actions concerning the northern spotted owl. In this instance, the ESC has exempted thirty-three out of forty-four timber sales from ESA's mandates, based upon its own cost/benefit analysis.[147] Some would argue that these actions are beyond the original scope of the ESC's powers.[148] Indeed, the ESC could conceivably become a device to test how much the public and the agencies are willing to sacrifice in terms of tangible short-term economic gain for the preservation of species,[149] many of which have benefits that are difficult to value.[150]

b. Appropriations Bill Rider Exemptions

Exemptions attached as riders to appropriations bills represent perhaps the most underhanded and disingenuous means of circumventing ESA protections.[151] These actions blatantly disregard the scientific findings of the agencies and the mandates of ESA. Indeed, local and regional politics take precedence over such factors.[152] One might argue that, in passing such a bill through the democratic process, a national consensus on the issue is created. Unfortunately, this seldom occurs because rider provisions are often attached to a popular or noncontroversial piece of legislation. As a consequence, rider provisions receive little or no congressional

---

ESC considered, such as the uncertainty of the economic benefit of the dam and the value of the surrounding farmland and archeological sites).

146. "Instead of weakening the ESA, Congress added the exemption process as a further burden on any applicant seeking to circumvent the ESA's mandate." des Rosiers, *supra* note 139, at 857-58. This conclusion is somewhat illogical. How is it that the exemption process places an added burden on the applicant seeking to circumvent ESA when it actually gives the applicant a loophole that was not there before?

147. Foley, *supra* note 57, at 272.

148. *See* Kathleen Trever, *The Endangered Species Committee: The Wizard or the Man Behind the Curtain*, 22 ENVTL. L. 1097 (1992) (concluding that the ESC was created to analyze single actions, and is not applicable to a series of actions, which would provide a long-term bypass of ESA mandates).

149. *Id.* at 1103 (arguing that the Bush Administration may have used the ESC in the Northern spotted owl controversy to test the political climate and the opinions of the public).

150. *See infra* notes 230-33 and accompanying text.

151. *See generally* Foley, *supra* note 57, at 275-81 (discussing how bill riders work and the manner in which they circumvent ESA).

152. Foley concludes that case-specific bill rider exemptions merely appease short-term economic and political interests, and undermine the long-term goals of ESA. *Id.* at 283.

debate.[153]

It was at the hands of such an appropriations bill rider that the snail darter was finally exempted from ESA protection. As efforts to receive an exemption under the ESC proved to be unsuccessful, a rider was passed as part of the Energy and Water Development Appropriations Act of 1980,[154] which specifically exempted the dam project from ESA compliance.[155] All of this was accomplished with little attention from the press and other congressmen, as the rider quietly passed through Congress.[156]

The Mount Graham red squirrel was the victim of a similar rider exemption. The squirrel is endemic to a single mountain in Arizona, which was also chosen as an optimal site for a scientific observatory.[157] The battle between environmentalists and scientists in favor of the observatory project was hotly contested, complete with threats of violence from radical environmentalists.[158] In the end, the apparent significance of constructing the observatory carried the day, as Congress passed the Arizona-Idaho Conservation Act (AICA),[159] incorporating a specific ESA exemption for the Mount Graham observatory project. Environmentalists continued the battle in court, challenging a Forest Service plan which permitted construction of the facility in *Mount Graham Red Squirrel v. Espy*.[160] The court upheld the Forest Service plan as complying with the AICA, regardless of ESA's mandates.[161]

Thus, appropriations bill riders offer a final loophole to regional interests to circumvent scientific findings in favor of ESA listing and protection. Taking this exemption in concert with the preceding factors and steps that hamper the ESA process, it should be evident

153. *See infra* note 156 and accompanying text.

154. Pub. L. No. 96-69, 93 Stat. 437 (1979) (codified as amended at 43 U.S.C. § 377(a) (1992)).

155. "[N]otwithstanding the provisions of 16 U.S.C., chapter 35 or any other law, the Corporation is authorized . . . to complete . . . the Tellico Dam . . . ." *Id.* at 449.

156. *See* EHRLICH & EHRLICH, *supra* note 28, at 222 (noting that very few Congressmen were in attendance at the passage of the bill, which was not read aloud in session).

157. For a full account of the events surrounding the controversy, see M. Mitchell Waldrop, *The Long, Sad Saga of Mount Graham*, 248 SCIENCE 1479 (1990).

158. At one point, members of the environmental group Earth First! hinted at the possibility that they would smash the mirrors of the telescopes if an observatory were constructed, and one university astronomer actually received a dead squirrel on his doorstep. *Id.* at 1479.

159. Arizona-Idaho Conservation Act, Pub. L. No. 100-696, 102 Stat. 4571 (1988) (codified as amended in scattered sections of 16 U.S.C.; 25 U.S.C.; 40 U.S.C. (1994)).

160. 986 F.2d 1568 (9th Cir. 1993).

161. *Id.* at 1579.

at this point that a party seeking to avoid ESA compliance can employ a variety of tactics to delay or completely avoid the implementation of ESA listing and critical habitat designations.

IV. ESA AS APPLIED TO THE PRESERVATION OF BIODIVERSITY: AN EXERCISE IN FUTILITY

Many of the previously cited criticisms of ESA are applicable to this section, and may in fact be further compounded within the context of biodiversity preservation. Moreover, there is a host of unique problems in the application of ESA to biodiversity preservation efforts. The presence of these problems is further evidence that ESA was not enacted as a measure to protect biological diversity, and that it cannot adapt to such a goal in its present form.

A. The Reactive Nature of ESA Has Unique Consequences When Applied to the Preservation of Biodiversity

The reactive nature of ESA presents further complications when applied to the preservation of ecological systems. Consider, for example, the red wolf and the California condor. Both species have been pushed to the brink of extinction, and agencies have resorted to captive breeding programs in an effort to establish viable populations of each for future release into the wild. Although these efforts are consistent with ESA's mandate to preserve individual species, captive breeding programs do not necessarily further the goal of preserving ecological systems as a whole. When agency attention and funding is drawn towards captive breeding programs, less effort and fewer resources may be apportioned to the preservation of the species' native habitat.[162] As a result, the species' habitat may further degenerate, threatening to thwart future reintroduction efforts, as well as the other species that inhabit the same ecosystem.

B. Concentrating Efforts on the Preservation of Individual Species Neglects Other Species Found within the Critical Habitat

In its current form, ESA only protects species that are "endangered" or "threatened", and the critical habitat necessary to provide for their survival.[163] Some would argue that the critical habitat

162. *See* Soulé, *supra* note 4, at 748 (noting that captive breeding programs may result in complacency over the loss of the species' critical habitat).

163. "Critical habitat" is defined as the area "essential to the conservation of the spe-

provision of ESA is an adequate safeguard to ensure that biological systems as a whole remain intact, and that the current emphasis on targeting individual species is the most efficient scheme, given public attitudes on conservation.[164] However, critical habitat designations will not protect the less attractive species that are endemic to an area that does not contain any of the more popular vertebrates.[165] Moreover, critical habitat areas are often too small to protect entire ecosystems.[166]

A reliance on popular species to preserve biodiversity as a whole has another shortcoming. The current version of ESA contains a provision against the taking of a listed species.[167] However, the taking provision of ESA only applies to species that are specifically listed as "endangered" or "threatened" under other portions of ESA.[168] Thus, species that are fortunate enough to reside within the critical habitat of a listed species do not receive the same level of protection. While their habitat may be protected as part of the critical habitat of a listed species, they are still fair game for takings, as defined in ESA,[169] so long as this activity does not disturb the critical habitat and long-term survival of the listed species.[170]

---

cies." 16 U.S.C. § 1532(5)(A)(i)(I) (1988).

164. One author recognizes the fact that large vertebrates often take precedence in conservation efforts, due to public perceptions. This reliance on large vertebrates does have a positive side effect. In general, large animals require large reserves, thus effectively preserving other species that are fortunate enough to reside within the protected species' critical habitat. *See* Jared Diamond, *The Design of a Nature Reserve System for Indonesian New Guinea, in* CONSERVATION BIOLOGY, *supra* note 45, at 485, 485-86. *See also* Kellert, *supra* note 41, at 59 (arguing a species approach to conservation can adequately protect biodiversity, by concentrating on popular species and adequately protecting a large tract of their habitat).

165. *See* Diamond, *supra* note 164, at 485-86. Consider, for example, a recent acquisition by The Nature Conservancy of rare eastern prairie habitat on Long Island, New York. The parcel is ecologically significant as representative of a larger historical ecosystem, yet would likely escape attention under ESA, due to a lack of popular species. *See Prairie Preservation: Good News, Bad News,* 174 NAT'L GEOGRAPHIC 761 (1988) (further noting that the parcel contains 147 species of native grasses and wildflowers).

166. *See* Jon D. Holst, *The Unforeseeability Factor: Federal Lands, Managing for Uncertainty, and the Preservation of Biological Diversity,* 13 PUB. LAND L. REV. 113, 123 (1992) (noting that ESA critical habitats are designed to cover those areas that are critical to a species' survival, and not necessarily for its recovery).

167. "Taking" a species is defined by ESA as any harassment, hunting, shooting, pursuing, harming, wounding, trapping, capturing, or collecting of a listed species. 16 U.S.C. § 1532(19) (1988).

168. *See* 16 U.S.C. § 1533 (1988) (listing standards for determining whether a species is "threatened or "endangered").

169. 16 U.S.C. § 1532(19) (1988).

170. For example, the Pacific Yew could conceivably be removed from the northern

C. *The Goal of Preserving Genetic Diversity Does Not Always Coincide with the Goal of Preserving Biodiversity*

As a general proposition, programs geared towards the preservation of genetic diversity will also tend to preserve ecological systems as a whole. There are, however, certain circumstances in which the preservation of a single species can actually jeopardize the proper functioning of an ecosystem. When this occurs, ESA protections may actually contravene the goal of preserving biological diversity.[171]

The Florida Everglades provides an excellent example of the potential consequences of such a dilemma. The Everglades is a unique ecosystem within the United States, and the vast diversity of species within the ecosystem have needs that may not be compatible with an ESA-type approach to conservation.[172] This became obvious in a recent proposal to restore the historical flow of water into the Everglades. The proposal provided a battleground for a rare debate between the competing interests of genetic and biological diversity preservation. The plan to divert the water flow was endorsed universally as a means to preserve the ecosystem, yet, to the surprise of most biologists, ESA proved to be a barrier to the implementation of the project. In February, 1990, a FWS biologist filed a "jeopardy opinion" under ESA,[173] stating that the snail kite, a bird that feeds exclusively on snails in an area that would be drained, would be impermissibly endangered by the water diversion plan.[174] Thus, under ESA, the short-term survival of a

---

spotted owl's habitat without effecting a "taking" on the listed species.

171. *See* Joe Alper, *Everglades Rebound from Andrew,* 257 SCIENCE 1852, 1852 (1992) (noting that many ecologists have recognized the fact that short-term single species survival is often at odds with the long-term survival of the ecosystem).

172. "In the Everglades we have over a dozen endangered or threatened species, each with varying needs that aren't necessarily compatible, within a changing ecosystem." *Id.* (quoting David J. Wesley, Florida supervisor for the United States Fish and Wildlife Service).

173. The ESA jeopardy provision states that "[e]ach Federal agency shall . . . insure that any action authorized, funded, or carried out by such agency . . . is not likely to jeopardize the continued existence of any endangered species or threatened species . . . ." 16 U.S.C. § 1536(a)(2) (1988).

174. This jeopardy opinion outraged many of the people working on the project, and the biologist was promptly reassigned to a post in Maine. *See* Alper, *supra* note 171, at 1853 (detailing the potential effects on the endangered snail kite, and the FWS reaction to the jeopardy listing). *See also* Rowland, *supra* note 121, at 508 (noting that one biologist admitted that he would approve draining the snail kite's breeding ground in order to save the Everglades ecosystem as a whole).

single species can delay and potentially halt efforts to save an ecosystem in its entirety.

V. REFORMATION OF ESA: MOVING TOWARDS A GOAL OF PRESERVING BIODIVERSITY

A. The Benefits of a Biodiversity Approach

Although certainly not a panacea, a biodiversity approach to conservation has practical benefits that can make it a more effective tool than any of its predecessors. A properly structured system of biodiversity preservation can protect more species at a total lower economic and political cost than ESA, and can better account for scientific data and principles. These potential benefits are discussed in detail in the following sections.

1. A Growing Number of Scientists Have Endorsed a Biodiversity Approach

Even as an increasing number of species are eradicated, our knowledge of how biological systems operate and how much diversity exists continues to grow. In response to the growing awareness of the magnitude of biological diversity and the concurrent loss of species, a new branch of science has emerged, aptly called by some "conservation biology."[175] One of the goals of conservation biology is to correct a perceived imbalance of public and governmental concern for a select group of game animals, as well as to study biological systems in their entirety.[176] The result has been a growing chorus of scientific and legal scholars that has come to endorse a biodiversity approach to conservation efforts in the United States and abroad.[177]

---

175. *See* Ann Gibbons, *Conservation Biology in the Fast Lane*, 255 SCIENCE 20 (1992) (noting the somewhat trendy move in science towards conservation biology).

176. *Id.* at 21.

177. *See, e.g.*, Hal Salwasser, *In Search of an Ecosystem Approach to Endangered Species Conservation, in* BALANCING ON THE BRINK OF EXTINCTION, *supra* note 103, at 247 (stressing the need for a more generalized ecosystem approach to preservation management); Faith Campbell, *The Appropriations History, in* BALANCING ON THE BRINK OF EXTINCTION, *supra* note 103, at 134, 145 (concluding that species should be listed in clusters, with a concentration on species that have a reasonable chance at survival); Albrecht & Jackson, *supra* note 68, at S1 (exploring the criticisms of the present version of ESA and suggesting that an ecosystem approach is the better approach); Holly Doremus, *Patching the Ark: Improving Legal Protection of Biological Diversity*, 18 ECOLOGY L.Q. 265 (1991) (criticizing the species-by-species approach of the ESA and urging a biological diversity approach as the focus of protective policy); Flevares, *supra* note 49, at

Other commentators still espouse the ESA approach as the most viable means of preserving biodiversity.[178] This faction justifies the species-by-species approach not on scientific terms, but rather in terms of the necessity to focus on species that have strong public appeal.[179] While it may be true that preservation efforts are much easier to conduct with strong public support, such an approach lacks scientific support, a point that is conceded by some adherents of the current ESA approach.[180] One commentator within the ESA camp, Stephen Kellert, argues that this lack of scientific support is not necessarily a negative concept. Rather, conservation efforts can and should target popular species, thus allowing other species to ride the coattails of these fortunate few in the form of critical habitat reserves. Kellert uses the example of Madagascan biodiversity to illustrate his point. He argues that conservation efforts in Madagascar should target the island's immensely popular lemur and loris species.[181] In so doing, the Madagascan government can garner more public support, and the resulting increase in funding can be utilized to create habitat reserves, which should, theoretically, protect the other species of the ecosystem. Yet, what happens to the ecosystems that are not inhabited by lemurs and lorises? Consider the rosy periwinkle, a known treatment in the fight against Hodgkin's disease.[182] What if it is not located within a territory set aside for the protection of the lemur and the loris species? A lack of scientific consideration can result in the loss of many unique and highly beneficial ecosys-

---

2039 (arguing that a biodiversity approach is needed, as well as a change in attitudes towards land use); L. Scott Mills, *The Keystone-Species Concept in Ecology and Conservation*, 43 BIOSCIENCE 219 (1993) (arguing that environmental management should focus on the complex interactions of entire systems, and not simply on individual species); Scott et al., *supra* note 16, at 782 (arguing that a focus on species-rich areas is the most efficient method of preserving biodiversity).

178. *See, e.g.*, Bean, *supra* note 73, at 77-79 (arguing that the ESA has been largely successful, and that critics' reliance on full recovery measures of success are myopic and unreliable).

179. Kellert argues that an ecosystem will not work simply because it will not appeal to the public. He writes: "From the perspective of what is phenomenologically important to the ordinary person, a single-species approach emphasizing biologically familiar animals may be an emotional, perceptual, and even ethical necessity." Kellert, *supra* note 41, at 59.

180. *See* Bean, *supra* note 73, at 85 (conceding that the current approach relies more on public perceptions than science, but concluding that a science-based biodiversity approach will fail to generate much needed public support).

181. *See* Kellert, *supra* note 41, at 59.

182. *See supra* note 24 and accompanying text.

tems and species.

Furthermore, an approach focusing on the preservation of individual species neglects the biological mechanics of species extinction. The extinction of any single species does not occur in a vacuum. The surviving species of an ecosystem interacted with that species in some manner, perhaps as part of a predator-prey or symbiotic relationship. Accordingly, each remaining species will be affected by an individual extinction in some way, perhaps through loss of habitat or food sources, and some may follow the fate of the first species.[183] Thus, the case for preserving biological systems as a whole finds strong support in the obvious interrelationships among species.

2. The Preservation of Biodiversity is More Cost-Effective than a Species-by-Species Approach

Cost-effectiveness is an increasingly important consideration in the effort to preserve biodiversity, and will continue to be of paramount importance in this age of budget deficits and economic hardship. The problems of inadequate funding are well documented,[184] and are exacerbated in Third World countries, many of which contain valuable warehouses of biological diversity.[185] If the United States is to be a world leader in the effort to preserve biological diversity, it must develop a cost-efficient plan. Otherwise, the poorer nations of the world are unlikely to follow suit.

As discussed previously, preservation battles can be fought at different levels, from the ecosystem level all the way down to the individual species level. There are reasons to believe that preservation at the ecosystem level is much more cost-effective than that at the species level. In general, the costs of managing a single, highly imperiled species are quite high, and the probability of success is

---

183. One author analogizes this phenomenon to an alcoholic contemplating one more drink, in light of the fact that he knows it will cause irreversible liver damage. In isolation, one more drink may reap high benefits in the form of satisfying his need for alcohol, with minimal costs in the form of a minute increase in liver damage. Yet, any medical expert would counsel against imbibing even a single drink, for it is well known that the alcoholic cannot stop with just one drink. Similarly, looking at a single extinction in isolation disregards the scientific evidence that extinctions compound over time, and that each species is dependent on that first loss. *See* Bryan G. Norton, *On the Inherent Danger of Undervaluing Species, in* THE PRESERVATION OF SPECIES, *supra* note 41, at 110, 132-33.

184. *See supra* notes 68-73 and accompanying text.

185. This reference is, of course, to the incredible diversity of life to be found in the tropical rainforests of the world.

quite low.[186] The costs of prevention tend to be much lower than the costs of rescue.[187] Furthermore, the likelihood of long-term success is much greater when the target of conservation is a sustainable, self-perpetuating ecosystem, rather than an imperiled species, which is subject to a variety of factors that can lead to its precipitous decline.[188] Finally, preserving an ecosystem as a whole preserves all of the inhabitants, regardless of current scientific or public valuations, at a total lower cost than concentrating on individual species.[189] Although developing countries often simply set aside large reserves, a system of diversity preservation can allow them to act in a more cost-efficient manner. Biodiversity considerations can ensure that these large tracts are the most biologically unique and diverse areas within any given nation.

A biodiversity approach to preservation can even result in economic benefits to the regulated community. Under the current regime, a great deal of uncertainty exists over whether any particular species is, or will become sufficiently endangered as to warrant protection under ESA. This leads to uncertainty in the prospect of developing a particular parcel of real estate, which ultimately leads to drop in property values and a decline in investment.[190] Although far from perfect, a biodiversity approach can reduce some of this uncertainty in investment by specifically targeting ecosystems as a whole, which do not rely on the status of any one particular and possibly obscure species. An agency determination of ecosystem boundaries could provide investors and developers with some assurance of finality.[191] In contrast, the status of an individ-

186. Scott et al., *supra* note 16, at 783.

187. *Id.* at 784. The authors lament: "It is a sad commentary that the current widespread practice of "Emergency Room Conservation" channels most of the economic and emotional support for the protection of biological diversity into those few species least likely to benefit from it." *Id.* at 783.

188. These factors include disease, genetic inbreeding, and environmental catastrophe. *See supra* note 86 and accompanying text.

189. As an example, the 7200 hectare Sacramento National Wildlife Refuge harbors 257 vertebrate species at a total annual cost of $1 million. By comparison, the California condor recovery program entails approximately the same annual costs. Scott et al., *supra* note 16, at 784.

190. The uncertainty over the proposed listing of the Houston toad led to this type of economic dislocation. *See* YAFFEE, *supra* note 69, at 65-66 (noting that lengthy delay and uncertainty under ESA frustrates developers, conservationists, and agencies themselves).

191. For example, an ecosystem-based plan in Austin, Texas has received an uncharacteristically low amount of criticism from developers. One of the reasons cited for this silence is the fact that such a plan will relieve many years of uncertain regulation. *See* Betsy Carpenter, *The Best-Laid Plans*, U.S. NEWS & WORLD REPORT, Oct. 4, 1993, at

ual species may be subject to much more dramatic change,[192] thus making investment and development an uncertain prospect.

3. The Political Benefits of Framing the Issue Broadly

The current emphasis on individual species also suffers from the fact that it leads to easily crystallized, simplified issues. Public perceptions are greatly influenced by the media, which can further sharpen the focus of the debate when a single species is at issue.[193] Unfortunately, simplified issues can be distorted easily and used to delay or halt the conservation of an individual species.

Consider, for example, the current debate over the northern spotted owl. The controversy has degenerated into a contest between owls and jobs.[194] In such a simplified form, the debate is easily understood by the public which, when faced with such a stark choice, would most likely favor the economic interests involved. Yet, such a narrow framing of the issue does not convey to the public the full extent of the matters at stake. It fails to recognize the value of the ancient forests of the Northwest as a whole,[195] in addition to the other species within the ecosystem.[196]

A similar fate befell the Mount Graham red squirrel. Once the again, the issue was framed narrowly under ESA, this time as a subspecies of squirrel versus a scientific observatory of international significance.[197] What the debate failed to report was the fact that Mount Graham actually represented a unique ecosystem in itself, with several endemic species of rodents, insects, plants, and snails.[198] As a result, the Mount Graham red squirrel lost its battle for protection under ESA.[199]

89, 90 (also noting that developers perceive that the plan will attract businesses into the communities that are attempting to improve their environmental image).

192. The tragic story of the passenger pigeon provides an excellent example of the potential for dramatic change.

193. *See supra* notes 116-20 and accompanying text.

194. *See generally* Foley, *supra* note 57, at 253 (detailing the battle over the northern spotted owl as it has developed in the courts and in the legislature).

195. *See* Booth, *supra* note 36, at 141 (noting that the ancient forests of the Pacific Northwest may partially curb the effects of global warming).

196. *See* 57 Fed. Reg. 1796, 1827 (1992) (to be codified at 50 C.F.R. § 17) (finding 60 potentially endangered species within the habitat of the Northern spotted owl).

197. For a complete history of the debate, see Waldrop, *supra* note 157, at 1479.

198. *Id.* at 1480 (noting that the high degree of endemism on Mount Graham is reportedly attributable to its ecological isolation since the last ice age).

199. *See supra* notes 157-61 and accompanying text.

These two incidents should be instructive to those commentators who still contend that the genetic diversity approach of ESA is the most feasible form of preservation. A few species, such as the bald eagle and the California condor may be able to withstand such narrow issue framing, but what about the vast multitude of marginally popular species? At some point, the fate of a single species becomes insignificant in comparison to large-scale economic dislocation. This is especially true during hard economic times. As a result, only the most popular and charismatic species may be able to withstand narrow issue framing. Moreover, the general public is effectively excluding from the debate, a fate that is offensive to our democratic ideals.

It should be obvious that the manner in which an issue is framed will have an enormous bearing on how it is resolved by the public and the courts. Broad issues tend to have more appeal, whereas narrow issues tend to distort the issue into one of simplicity, where only one solution appears to be possible.[200] A biodiversity approach avoids the pitfalls of narrow issue framing because the courts and the public are forced to consider the entire picture. Thus, battles over preservation cannot be depicted as one seemingly insignificant species versus economic growth. Rather, broad issue framing enhances the public's awareness of the entire matter at stake, and leads to a greater appreciation of the value of biodiversity as a whole. Moreover, a debate over the merits of preserving a scientifically significant ecosystem, with all of its diversity of plant and animal life, should not have the same talismanic powers that an "owls vs. jobs" debate can have. In the absence of such highly charged emotions, a rational debate on scientific and economic considerations is more likely to occur.

200. Consider, for example, Bowers v. Hardwick, 478 U.S. 186 (1986). In holding that homosexuality is not a fundamental right deserving protection under the 14th amendment, the majority framed the issue as "whether the Federal Constitution confers a fundamental right upon homosexuals to engage in sodomy." *Id.* at 190. The quick answer to such an inquiry would probably be a resounding no. However, the dissent disagreed with the majority's framing of the issue, calling it a case about "the right to be let alone." *Id.* at 199 (Blackmun, J., dissenting). When the issue is framed in this manner, the constitutional debate is certainly more open and subject to different resolutions.

VI. BIODIVERSITY PROTECTION IN PRACTICE: PRACTICAL CONSIDERATIONS

Amending or significantly altering ESA will not be an easy task.[201] Given today's sluggish economic climate, any change in ESA that would result in stricter protections at a substantially higher cost to society would likely meet serious opposition.[202] These factors must be considered in evaluating current proposals to amend ESA, and in the implementation of an effective biodiversity preservation program.

A. Current Trends and Proposals

The range of current proposals runs from the conservative to the controversial. They reflect an array of different philosophies of conservation, and their strategies range from the promotion of economic development to the locking away of vast tracts of federal lands. As a complete analysis of the full range of proposals is beyond the scope of this Note, it will suffice to explore proposals at either extreme, as well as some that fall within the middle ground.

One of the more conservative proposals is the Progressive Endangered Species Act (PESA),[203] which seems to be a reaction to the current economic recession. The bill recognizes the inherent value of natural species themselves, yet also strives to appease development interests by creating a sort of cost/benefit analysis as a step in the preservation process.[204] As will be developed in the following section of this Note, economic analysis is not well understood within the context of non-marketable species and habi-

---

201. *See* Donald J. Barry, *Amending the Endangered Species Act, The Ransom of Red Chief, and Other Related Topics*, 21 ENVTL. L. 587 (1991) (asserting that substantially amending ESA is nearly impossible, due mainly to committee jurisdiction and political inertia).

202. *See On Endangered Species . . . Have Pity On Homo Sapiens*, L.A. DAILY JOURNAL, Apr. 21, 1992, at 6 (stating that "[t]he fact that much of the human species is hurting economically may not count for much with crusading ecologists, for whom they are not the favorite fauna anyway." (reprinting an editorial from the *Wall Street Journal* criticizing the "overreaching" of the ESA and its economic effects)).

203. S. 3159, 102d Cong., 2d Sess. (1992).

204. *See* Davina Kari Kaile, *Evolution of Wildlife Legislation in the United States: An Analysis of the Legal Efforts to Protect Endangered Species and the Prospects for the Future*, 5 GEO. INT'L ENVTL. L. REV. 441, 477-78 (1993) (recommending a cost/benefit aproach to preservation efforts, and supporting proposed PESA and similar reform proposals).

tats.[205] When balancing the inherent and somewhat immeasurable value of an individual species against the tangible costs of preservation, it is realistic to expect that many species would not qualify for protection under PESA.

At the other end of the spectrum is the Wildlands Project,[206] an ambitious plan that could effectively preclude the economic development of nearly one half of the continent.[207] The basic idea of the project is to create a series of core reserves, multiple use zones, and connecting corridors[208] as a means of not only maintaining the current level of biodiversity in the United States, but returning it to its historical levels.[209] As one would expect, critics, including environmental groups, have deemed the project politically and economically infeasible.[210] Even so, some of the ideology of the Wildlands Project is currently at work in efforts to expand Yellowstone and Denali National Parks.[211]

A number of proposals occupy the middle ground between these polar opposites. One in particular deserving attention is the court's treatment of the issues in *Marble Mountain Audubon Society v. Rice*.[212] The case is important because it marked the first time that a court explicitly recognized the importance of biodiversity considerations in agency actions within the context of the National Forest Management Act.[213] The precedential value of the ruling is that it gives the court the authority to review projects on a case-by-case basis to ensure that the agency properly accounted for biodiversity considerations.[214] Although this methodology is by no means a solution to the problem of successfully protecting biodiversity,[215] it does represent an important step forward, in that

205. *See infra* notes 230-33 and accompanying text.

206. For a complete discussion on the details of the Wildlands Project, see Charles C. Mann & Mark L. Plummer, *The High Cost of Biodiversity*, 260 SCIENCE 1868 (1993).

207. *Id.* at 1868.

208. The ecological value of corridors is questioned by ecologists, while it is clear that they entail enormous economic costs. *Id.* at 1870. *But see* Rudbach, *supra* note 77, at 197 (citing one scientist who advocates the use of biological corridors).

209. Mann & Plummer, *supra* note 206, at 1869. Some of the core reserves would range up to nearly one million square kilometers in size. *Id.*

210. The Nature Conservancy is one such critic of the plan. It argues that the focus of preservation efforts should concentrate on areas that presently contain unique or high levels of biodiversity. *Id.* at 1870-71.

211. *Id.* at 1870.

212. 914 F.2d 179 (9th Cir. 1990).

213. *Id.* at 182. For a full account of the case, see Rudbach, *supra* note 77.

214. *Marble Mountain Audubon Soc'y*, 914 F.2d at 181-82 (holding that judicial review was appropriate).

215. *See* Rudbach, *supra* note 77, at 203 (concluding that the court's approach of ad-

the court finally recognized what scientists had long considered an important step in agency decisionmaking and environmental assessment.

Efforts to preserve biological diversity have also developed within Congress. In proposing the National Biological Diversity Conservation and Environmental Research Act[216] and the National Biological Diversity Conservation Act,[217] Congress has recognized the importance of preserving biological diversity and of becoming a world leader in the field.[218] Specifically, both bills mandate: 1) the establishment of a national policy on the preservation of biodiversity; 2) better direction in the development of conservation strategies; 3) creation of a research center for biodiversity studies; and 4) a statement of biodiversity effects within environmental impact statements.[219] Although these bills are still in the formative stages, they represent a step forward and have received positive feedback from the scientific community.[220]

Thus, the beginning of a national program designed exclusively for the preservation of biodiversity is being debated in Congress. As these bills and the above-mentioned proposals are debated in legal and scientific circles, it is essential to consider several factors that any proposal to preserve biodiversity must address. These factors are discussed at length in the following sections of this Note.

B. Compilation of a Biological Inventory

The first step in any scheme to preserve biodiversity should be the implementation of a system to catalog the existing biodiversity of a given area. Recognizing the existence of a species is critical

---

dressing the issue of biodiversity on a case-by-case basis is highly inefficient).

216. H.R. 585, 102d Cong., 1st Sess. (1991).

217. H.R. 2082, 102d Cong., 1st Sess. (1991).

218. "These bills will restore U.S. leadership in the global effort to conserve precious biological resources ranging from our natural germplasm resources to ecosystems and the services that they provide." *H.R. 585 and H.R. 2082, National Biological Diversity Conservation, 1991: Hearings on H.R. 585 and H.R. 2082 Before the Subcomm. on Environment of the Comm. on Science, Space and Technology*, 102nd Cong., 1st Sess. 4 (1991) (opening statement of Hon. James H. Scheuer).

219. *Id.* at 3.

220. "We need a National Biological Inventory to discover the many small, inconspicuous critters that may be vital to ecosystem functioning and that exist in all the unstudied corners of our country . . . . I heartily endorse all aspects of HB 585 and wish you the best possible luck in obtaining passage through Congress." *Id.* at 134 (testimony of Patricia T. Bradt, Ph.D., Principal Research Scientist, Environmental Studies Center, Lehigh University).

to protecting it. Moreover, a catalog of biological assets can aid in the allocation of funding to regions that need it most.

A growing number of scientists and political bodies have recognized the importance of a biological inventory.[221] Such action must be initiated in the near future if we are to understand the consequences of our current actions, and the magnitude of the loss at stake. Current government efforts are inadequate, and much of the data is being compiled by private organizations, most prominently The Nature Conservancy.[222] Clearly, a full-scale governmental effort is in order to allocate funding more efficiently, as well as to increase the public's awareness of the magnitude of the problem.

C. The Pros and Cons of Economic Analysis

Some would argue that a cost/benefit analysis is an essential element of a properly functioning program that seeks to balance economic growth with the preservation of biodiversity.[223] Undeniably, the maintenance of a steady level of economic growth is a relevant factor in any regulatory scheme. Indeed, it is hard to imagine a regulatory scheme as garnering widespread public support if the result could be sluggish economic growth. In the final analysis, however, widespread use of cost/benefit measures will likely result in a stifling of preservation efforts, in light of the fact that the economics of biodiversity is not a well-understood concept.[224]

Those in favor of a cost/benefit analysis would argue that the current lack of economic analysis within the structure of ESA[225] has in fact been its most serious shortcoming in its efforts to pre-

---

221. *See, e.g.*, OTA REPORT, *supra* note 29, at 8 (recognizing enhancement of the current knowledge base as one of the pertinent issues in preserving biodiversity); Raven, *supra* note 3, at 772-73 (stressing the need for a biological inventory of natural resources within the United States); Scott et al., *supra* note 16, at 787 (arguing that the Geographic Information System, which identifies species-rich areas, is the first step towards the efficient preservation of biodiversity).

222. *See* UNITED STATES CONGRESS, OFFICE OF TECHNOLOGY ASSESSMENT, 99TH CONG., ASSESSING BIOLOGICAL DIVERSITY IN THE UNITED STATES: DATA CONSIDERATIONS 14 (1986) (recognizing the importance of The Nature Conservancy's efforts, in light of the fact that it is the only institution that is currently collecting data on rare and endemic species).

223. *See, e.g., infra* note 227.

224. *See infra* notes 230-33 and accompanying text.

225. ESA listings are to be based solely on the "best scientific and commercial data available." 16 U.S.C. § 1533(b)(1)(A). This reliance on science alone was upheld in TVA v. Hill, 437 U.S. 153, 194 (1978) (holding that ESA does not authorize a balancing of economic interests).

serve genetic diversity. This group of critics contends that the absence of economic evaluation of natural resources places these interests at a disadvantage with those that are easily quantifiable.[226] Some commentators attribute ESA's failure to the excessive rigidity of its application in the absence of economic analysis.[227] As a result, natural resources are left with no economic value to compare against the easily quantifiable economic costs of preservation.[228] Others argue that the current loss of diversity is due largely to improperly functioning economic markets.[229]

Economists have responded to these concerns, and efforts have been undertaken to better understand the economics of preserving natural species with no readily quantifiable market price.[230] Unfortunately, these programs are in the early stages of development, and many logistical problems remain.[231] Indeed, some of these methods may take years to formally develop.[232] The preservation of biological diversity cannot wait for the complete development of economic models. As a result of these factors, and those to be discussed below, economic considerations should not be used as a guiding force in the present development of a scheme to preserve biological diversity.[233]

---

226. *See* Steve Nash, *What Price Nature? Future Ecological Assessments May Chart the Values, and the Odds*, 41 BIOSCIENCE 677, 677 (1991) (citing the current proposal to drill for oil in Alaska's Arctic National Wildlife Refuge: the estimated value of oil is $79.4 billion, the estimated value of the ecosystem is unknown).

227. *See* Kaile, *supra* note 204, at 441 (concluding that ESA has failed because a lack of economic considerations renders its application too burdensome and rigid).

228. *See* Christine M. Augustyniak, *Economic Valuation of Services Provided by Natural Resources: Putting a Price on the "Priceless,"* 45 BAYLOR L. REV. 389, 389 (1993) (arguing that neglecting to attach values results in "resources being treated as though they have a zero price, i.e., the resources are 'valueless'").

229. *See* Malcolm Gillis, *Economics, Ecology, and Ethics: Mending the Broken Circle for Tropical Forests, in* ECOLOGY, ECONOMICS, ETHICS, *supra* note 2, at 155 (arguing that tropical forests are depleted at an undue rate because of improperly functioning markets: bad pricing, inaccurate discounting, and public goods are all factors).

230. *See, e.g.*, *The Price of Everything, the Value of Nothing*, ECONOMIST, July 31, 1993, at 63, 63 (noting the development of a United Nations system of national accounts as a basis of measuring national income and wealth). *See also* Nash, *supra* note 226, at 680 (listing various programs currently under consideration).

231. For example, the U.N. system of national accounts is flawed in three respects: 1) clear air and forests do not contribute to a nation's wealth; 2) there is no depreciation for the use of natural capital; and 3) environmental loss damages are not recorded in the system. *The Price of Everything, the Value of Nothing*, *supra* note 230, at 63. Others have criticized the inherent uncertainty of risk assessment guidelines as a tool to rationalize development. *See* Nash, *supra* note 226, at 678.

232. Nash, *supra* note 226, at 677 (EPA risk assessment guidelines may take up to 10 years to formulate).

233. *See* Wilson, *supra* note 2, at 8-9 (arguing that more development of economic val-

First, it can be argued that economic analysis already plays an implicit role in the preservation of biodiversity, and that any further consideration of economic factors will only serve to weaken the efforts of preservationists.[234] Moreover, the difficulty in quantifying the benefits of nonmarketable species, some which may yield enormous future benefits in the form of scientific breakthroughs, militates against the use of economic evaluations as well, since undervaluation will be inevitable.[235]

Second, the problem is exacerbated by debate over the proper amount of error that society is willing to accept. In general, the rational approach would be to err on the side of overprotection, as compensation for unforeseen and undervalued benefits.[236] However, economic valuations tend to favor short-term benefits, at the expense of long-term, unforeseeable, and intangible benefits.[237]

As a result, many courts and commentators have eschewed economic valuations within the context of biodiversity preservation.[238] Straight cost/benefit analyses should be avoided until we better understand their implications and methodology. At present, economic analyses are occasionally subject to abuse and may result in an unwarranted delay or cessation of preservation efforts.[239] Moreover, these types of economic valuations do not take into ac-

---

uation systems is needed before such a system of cost/benefit analysis can be implemented).

234. *See* Robert L. Fischman, *The ESA Already is a Balancing Act*, 7 ENVTL. F. July-Aug. 1990, at 31-32 (arguing that the critical habitat designation process already factors in economics, and that it would be unwise to further consider economics until we know how economics has diluted ESA in the first place).

235. "[W]e have only the most rudimentary understanding of the benefits side of the equation—we have yet to discover the virtues of most species." Micheal J. Bean, *We Don't Know the Benefits Side of the Equation*, 7 ENVTL. F. July-Aug. 1990, at 30.

236. *See* Holst, *supra* note 166, at 113 (arguing that the unforeseeability of the benefits of biodiversity is a compelling justification for its preservation as a whole).

237. *See* Raven, *supra* note 3, at 770 (arguing that the short-term gain of economic projects is often favored because we do not understand the economics of biodiversity).

238. *See, e.g.*, David P. Berschauer, *Is the "ESA" Endangered?*, 21 SW. U. L. REV. 991, 1016 (1992) (concluding that further considerations of economics within the ESA framework would render the act a "nullity"); Ohio v. United States Dep't of Interior, 880 F.2d 432, 459 (D.C. Cir. 1989) (rejecting the use of straight market values in Superfund damage assessments); Rowland, *supra* note 121, at 518 (contending that economic valuations are useless, due to the fact that species decline is generally an external cost of exploitation).

239. *See* Joan Hamilton, *The Species Axe: A Prized Conservation Law Lies on Congress' Chopping Block*, SIERRA, Jan./Feb. 1992, at 29, 30 (1992) (noting that of 28,000 yearly FWS consultations with developers, only a handful result in halted projects).

count the intrinsic value and rights of species.[240] In light of our present state of knowledge and the unusual factors involved in the consideration of biological systems, it would be unwise to implement a straight cost/benefit analysis to evaluate current efforts to preserve biodiversity.[241]

This is not to say, however, that economic factors should be completely disregarded. Indeed, past legislative efforts at regulation without cost considerations have come under frequent and harsh criticism from commentators.[242] Thus, some method of weighing the costs and benefits of a proposed action to protect biological diversity is in order. As discussed previously, a straight comparison of costs and benefits is not appropriate at this time, given the inherent problems in evaluating ecosystems. In contrast, a balancing test that favors protection measures unless the costs "substantially outweigh" the benefits of preservation seems to strike the proper balance. Such a test would not preclude preservation of ecosystems that are inherently undervalued, but it will also avoid conflicts over land use where the costs are clearly higher than any potential benefits. Under this proposal, debacles such as the snail darter contro-

---

240. *See supra* notes 39-48, 230-33 and accompanying text.

241. One commentator notes the general unreliability of economic considerations in this context as follows:

> Ask an individual what we ought to do *as a nation*, however and he or she is likely to approve of programs to preserve species, even at some cost to consumers. For what we demand as *citizens* can be quite different from what we are willing to pay for as *consumers* . . . . We believe that Congress should express not just our interests as consumers but our aspirations and convictions as citizens.

Mark Sagoff, *On the Preservation of Species*, 7 COLUM. J. ENVTL. L. 33, 66 (1980) (emphasis in original).

242. *See, e.g.*, Cass R. Sunstein, *On the Costs and Benefits of Aggressive Judicial Review of Agency Action*, 1989 DUKE L.J. 522, 526 (noting that "the courts' literal approach to the Delaney Clause has increased regulatory irrationality by imposing serious costs and in fact bringing about fewer rather than more improvements in safety and health"); Charles H. Blank, *The Delaney Clause: Technical Naivete and Scientific Advocacy in the Formulation of Public Health Policies*, 62 CAL. L. REV. 1084 (1974) (discussing the unreasonableness and irrationality of the clause). *See also* COMM. ON SCIENTIFIC AND REGULATORY ISSUES UNDERLYING PESTICIDE USE PATTERNS AND AGRICULTURAL INNOVATION OF THE NATIONAL RESEARCH COUNCIL, REGULATING PESTICIDES IN FOOD: THE DELANEY PARADOX 12-13 (1987) (concluding that a similar zero-risk approach to pesticide regulation would be less effective and more costly than a negligible risk approach). The Delaney Clause of the Federal Food, Drug, and Cosmetic Act, 21 U.S.C. §§ 301-395 (1988), is perhaps the most infamous congressional attempt at regulation without cost considerations. Specifically, the Delaney Clause prohibits the use of any food additives that are found to be carcinogenic in animal tests, regardless of the cost or technological feasibility of removing the substances. 21 U.S.C. § 48(c)(3)(A) (1988).

versy can be avoided, thus lending flexibility and legitimacy to ESA conservation efforts.

D. Use Science Realistically

As discussed previously, it should be apparent that science is not the infallible, completely objective decisionmaking process that much of the public and the courts believe it to be.[243] It is, however, still misunderstood and courts are generally highly deferential to scientific conclusions.[244] This combination of factors has allowed a number of nonscientific criteria to be implemented under the guise of scientific decisionmaking.[245] To be sure, these nonscientific criteria do not necessarily have a negative impact on the regulatory process. Indeed, they enlighten public policy makers on the preferences and demands of society as a whole, as well as lesser-known regional interests. This informs and elevates the debate into a consideration of all relevant factors, scientific or otherwise.[246] It is only when science acts as a subterfuge for these considerations that the process becomes distorted. To minimize these negative effects, agencies should be given a more specific mandate from Congress. This guidance should include not only scientific criteria, but also general policy statements that an agency would have to follow when faced with these external influences. Finally, a heightened degree of judicial review of agency actions is required, in order to ensure that agencies are properly evaluating both scientific data and policy considerations.[247]

---

243. *See supra* notes 88-96 and accompanying text.

244. *See, e.g.*, Ethyl Corp. v. EPA, 541 F.2d 1, 36 (D.C. Cir. 1976) (holding that "the court must give due deference to the agency's ability to rely on its own developed expertise."), *cert. denied*, 426 U.S. 941 (1976); Baltimore Gas & Elec. Co. v. Natural Resources Defense Council, 462 U.S. 87, 103 (1983) (holding that when an agency is operating at the frontiers of science, "a reviewing court must generally be at its most deferential.").

245. *See supra* note 91.

246. Yaffee puts the point succinctly:

> Rather than bemoaning the fact that politics enters into endangered species decision making, we should recognize the realities of the situation and work to exploit the benefits of political benefits—as sources of information about collective values and how intensely they are held—and minimize the negative effects of such forces on species preservation.

Steven L. Yaffee, *Avoiding Endangered Species/Development Conflicts Through Interagency Consultation, in* BALANCING ON THE BRINK OF EXTINCTION, *supra* note 103, at 86, 92.

247. *See* Doremus, *supra* note 177, at 18 ECOLOGY L.Q. 265 (arguing that the single species approach of ESA is ineffective in dealing with biological diversity and that the U.S. needs a more specific focus on ecological diversity).

E. A System of Triage: Concentrate on Saving the Most Unique and the Most Species-Rich Ecosystems

The current pace of extinction mandates swift action. We must concentrate on saving what is intact today, because the re-creation of ecosystems is not a proven technology.[248] As the growing magnitude of the loss becomes evident, we must concentrate our efforts on areas where funding would be spent most efficiently.

Undoubtedly, a system of triage would be highly controversial. Some would contend that such a concentration of efforts will result in the unwarranted neglect of some species and ecosystems. In this view, a system of triage admits defeat, a statement that many biologists are not ready to make.[249] Alas, in light of our increasing awareness of the enormous loss of biodiversity[250] and a general scarcity of funding, it would appear that such rhetoric against an admission of defeat does not reflect the realities of the situation.

Several biologists have argued in favor of such a system, recognizing the fact that we simply cannot save every single species and each distinct ecosystem. Perhaps not surprisingly, members of this minority camp are often harshly criticized by the media and their scientific colleagues.[251] However, their ranks will likely expand as the loss of biodiversity continues to accelerate. As unattractive as it may be, a system of triage is preferable to the current system, where many species will be lost due to delay and inade-

---

248. *See* Leslie Roberts, *Wetlands Trading is a Loser's Game, Say Ecologists*, 260 SCIENCE 1890 (1993) (noting the general consensus of opinion that the man-made creation of wetland ecosystems has proven to be ineffective). One EPA researcher commented that these projects often look more like "swimming pools" than natural ecosystems. *Id.* at 1891.

249. *See* Leslie Roberts, *Hard Choices on Biodiversity: With Many Species on the Verge of Extinction, Biologists Call for a Quick and Dirty Survey to Chart the Biodiversity on the Planet*, 241 SCIENCE 1759 (1988) (exploring the current debate over the most efficient means of preserving biodiversity, including a system of triage). One biologist argues that we should "set our sights high and not be afraid of the cost, rather than to start admitting defeat and say triage is necessary." *Id.* at 1761 (comments of Thomas Lovejoy, assistant secretary for external affairs at the Smithsonian Institute).

250. *See supra* note 3.

251. Consider, for example, Dr. James Brown of the University of New Mexico, an ardent supporter of a system of triage. Dr. Brown has stated that "[w]e can't afford to be concerned with the loss of some species." Roberts, *supra* note 249, at 1761. Lovejoy of the Smithsonian called such a proposal "unattractive." *Id.* In this article, Roberts herself refers to Dr. Brown as a "heretic." *Id.* at 1760. *See also* NORMAN MYERS, THE SINKING ARK 51 (1979) (stressing the need for a system of triage in preservation efforts); Flevares, *supra* note 49, at 65 (arguing that "[i]nevitably, because we cannot protect all species we must develop methods to save the largest number possible").

quate funding. Moreover, a system of triage can be adapted to respond to the needs of the rainforests, as well as our own biodiversity. In areas such as the tropical rainforests, where the rate of extinction is high and the sheer quantity of biodiversity is also high, a system that concentrates on a single species would prove futile. A system of triage would identify those areas with the most unique or the greatest numbers of species as the ones to be targeted first. Thus, triage can be utilized to preserve biodiversity in the United States and abroad in the most cost-effective manner. We are already condemning millions of species to extinction through our economic activities; triage represents a means of controlling which species and habitats are condemned.[252]

A properly designed system of triage would have to account for all of the factors that enter into the decisionmaking process,[253] including those specifically discussed in earlier sections of this Note. Furthermore, it can draw on the experiences of the triage practices of modern medicine.[254] Triage is a tool that is to be used carefully, ensuring that all of the relevant factors are considered, and that these considerations are explicitly enumerated. With these precautions, a system of triage can react to the realities of the current state of biodiversity loss in a cost-efficient manner.

VII. CONCLUSION

It is clear that ESA has not been an effective tool in the effort to preserve genetic diversity. Furthermore, ESA cannot be adapted properly to the goal of biodiversity preservation: this was not a goal of the original Act and the necessary structure for the preservation of biodiversity is not in place. The preservation of biodiversity requires a fundamental reformation of ESA.[255]

---

252. This proposition may be rather unappealing, but consider one author's perspective on the problem: "Nobody will like the challenge of deliberately consigning certain species to oblivion. But insofar as we are already consigning huge numbers to oblivion, we will do it better with some selective discretion." Norman Myers, *Biological Diversity and Global Security, in* ECOLOGY, ECONOMICS, ETHICS, *supra* note 2, at 19, 19.

253. Myers notes that biological, economic, political, and cultural factors must be contemplated within a system of triage. *Id.*

254. For an examination of the ethics and practice of triage within the context of modern medicine, see GERALD R. WINSLOW, TRIAGE AND JUSTICE (1982).

255. As discussed previously, the current network of environmental statutes and agencies cannot provide the same impetus that a reformed Endangered Species Act can provide, due to conflicting agencies and overlapping jurisdictions. *See supra* notes 50-57 and accompanying text.

Change will not come easily, and will only occur if public attitudes and perceptions are changed. It is evident, however, that some of these perceptions are changing and that the American public would most likely support a program to preserve our biological diversity.[256]

Immediate action undoubtedly will entail high costs to society. These costs can be balanced against the benefits of preserving biodiversity, and preservation efforts should only be implemented when the costs of preservation do not substantially outweigh the benefits of such action. It is also conceded that the preservation of biological diversity may require some restrictions on private property rights and/or increased government expenditure for the acquisition of additional tracts of land. These costs can be contained, however, through the use of market incentives to alter private sector behavior.[257] In addition, a system of income tax deductions for private land owners who forego lucrative development opportunities to preserve their lands would provide a powerful incentive.[258]

An efficient and effective conservation program cannot be designed without a consideration of the factors that affect each and every conservation decision. A newly-reformed ESA must explicitly account for these factors, in order to better understand and control them. A rational system of preservation, and indeed our democratic system, requires no less than a complete and open consideration of all potential factors and constituencies.

The factors and choices to consider are clear, and the time for action is now. In the time it took you to read this Note, another 3 square miles of tropical rainforest have been converted into pasture.[259] Failure to act now will result in the further irreversible

256. The success of The Nature Conservancy is illustrative of these changing public attitudes. It counts over 600,000 members, and as of 1990 had purchased over 5.2 million acres of land for preservation purposes. John C. Sawhill, *Facing Future Challenges to Conservation*, NATURE CONSERVANCY, Nov./Dec. 1990, at 6-7. For another example of changing public perceptions, consider recent efforts at preserving the wolf. *See supra* notes 108-10 and accompanying text (discussing efforts to reintroduce wolves into Yellowstone National Park).

257. An example of the manner in which environmental legislation can affect market incentives is the pollution permit trading system of The Clean Air Act, 42 U.S.C. § 7151 (1990).

258. The Internal Revenue Code provides a similar incentive for soil and water conservation measures. *See* 26 U.S.C. § 175 (1988) (providing an income tax deduction for soil and water conservation expenditures).

259. This figure assumes an average of 30 minutes of reading time. *See* Raven, *supra*

loss of the wondrous diversity of life on earth. This loss will affect our lives and our children's lives in unforeseeable ways. Indeed, an immense, irreplaceable storehouse of wealth and knowledge will be lost for all eternity.

> [H]uman subtlety . . . will never devise an invention more beautiful more simple or more direct than does nature, because in her inventions nothing is lacking, and nothing is superfluous . . . .[260]

JAMES DROZDOWSKI†

note 3, at 771 (estimating a rate of one square mile of tropical rainforest deforestation every 10 minutes).

260. LEONARDO DA VINCI, THE NOTEBOOKS OF LEONARDO DA VINCI 179 (Edward MacCurdy trans., vol. 1 1954).

† The author would like to thank Professor Wendy Wagner and Michelle Slack for advice and perceptive suggestions on earlier drafts of this Note without implicating them in the final product. I would also like to thank my parents and, most particularly, my wife Katie, for their constant and seemingly infinite support.